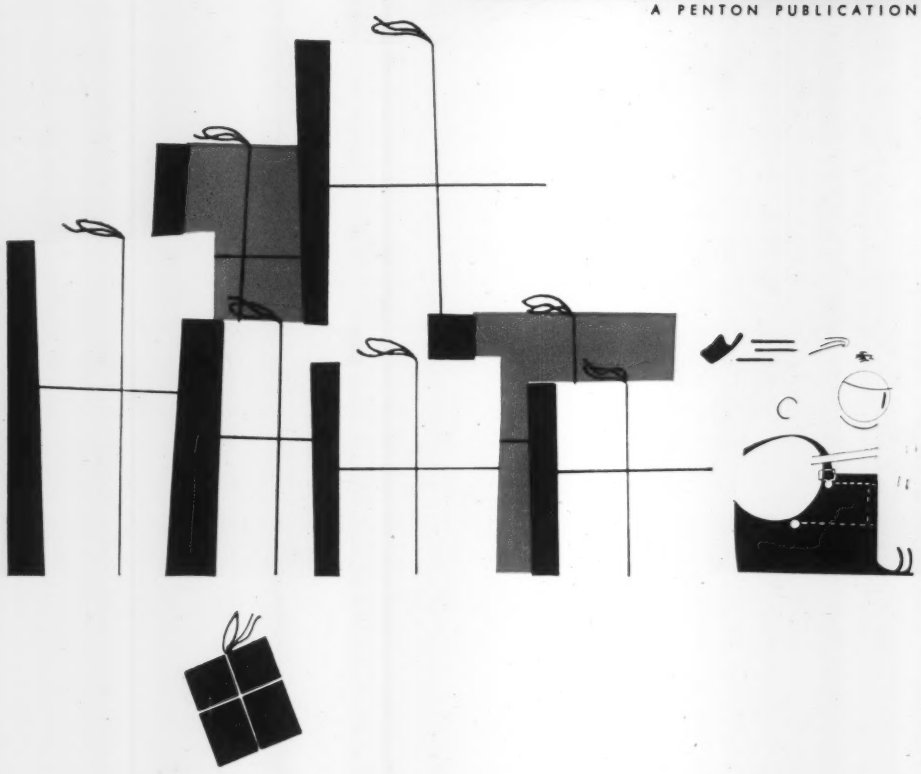
A PROGRAM FOR MANAGEMENT
1958 . . . No. 2

MARCH 17, 1958

STEEL
The Metalworking Weekly

A PENTON PUBLICATION



Production Control for Profits

Here is the kind of knowhow you need to get orders out on time and at lowest cost . . . Page 83

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✔ **Family of Specials Handles Short Runs . . . Page 96**

✔ **Steel Strapping Goes More Automatic . . . Page 129**

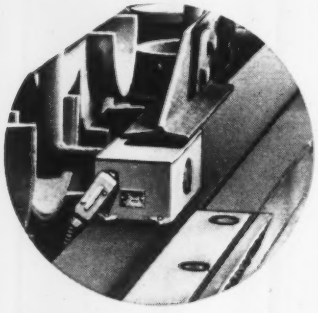
New EC&M AIR-GAP LIMIT SWITCH

Operates Without Physical Contact! ...Cuts Maintenance!

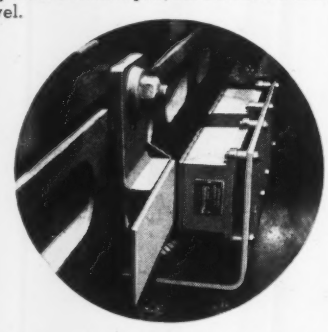
This new EC&M air-gap limit switch is substantially smaller, less costly and easier to apply than the previous design introduced by EC&M in 1948. The standard limit switch may be used on a 110, 220, or 440 volt, 60 cycle outlet. A transformer, self-contained in the relay-enclosure, has taps for quick adaptation for the various voltages. These limit switches are supplied with relays arranged to open or close a circuit.

These air-gap limit switches are ideal for scores of applications. Where engagement-type limit switches are subject to high maintenance and breakage due to impact, these air-gap switches have been giving years of trouble-free operation.

PROVEN IN SERVICE

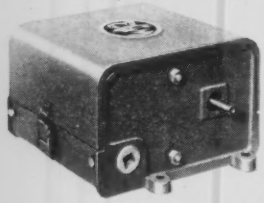


Pipe machine is stopped and reversed as steel operating vane *passes over* stationary reactor. Additional air-gap limit switches provide slowdown at both ends of travel.



Planer has "cut" and "return" reactors mounted on common stationary bracket. Steel operating vane for "return" is adjustable on planer bed. Vane for "cut" also adjustable along planer bed.

NEW EC&M Cam-Type Limit Switch



For reversing and non-reversing applications, these new Bulletin 9008 Type RC Limit Switches save space. This new design is very compact, but retains the advantage of individual cam adjustment without disturbing adjacent cam settings. Roller-operated silver contacts are double-break for high interrupting capacity and long life.

Write for Bulletin 9007-RZ

FOR BASIC STEEL MAKING, IT'S EC&M CONTROL

THE ELECTRIC CONTROLLER & MFG. CO.

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9819

IT HAS A JOB
in one of the world's most spectacular machines

This forged-steel cylinder, one of four supplied by Bethlehem, was built for use in a king-size hydraulic jacking system. Sound rather prosaic? It isn't. The jacking devices are part of the leveling equipment in one of the world's most spectacular machines—the Marion 5760.

The 5760 is an electric power shovel so huge as to defy description. In working position the top of the boom is as high above ground as the roof of a 12-story building. Dipper capacity is 70 cu yd.

The cylinder forgings that Bethlehem furnished weigh 11½ tons each. They are 10 ft 3½ in. long. They have a maximum OD of 48 in. and a body OD of 45 in. In each case the diameter of the main bore is 35¼ in. These are big cylinders, rugged and strong—as they would have to be in a shovel of such giant proportions.

You yourself may never need forgings of this general nature. Perhaps your requirements run to smaller items, or something much larger. But no matter what the design, Bethlehem is always able to meet your specifications. Bethlehem's integrated set-up can produce all types of press, hammer, and closed-die forgings, and machine them as desired. When you are next in the market, we suggest you check fully with our engineers.

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BETHLEHEM STEEL

BETHLEHEM STEEL

creative designing calls for an open mind

Leonardo Da Vinci's design for a pump using the Archimedian screw principle *Model courtesy of IBM*

EVEN DA VINCI'S DESIGN FOR A PUMP COULD HAVE BEEN BETTER WITH HELP FROM AN SKF ENGINEER.

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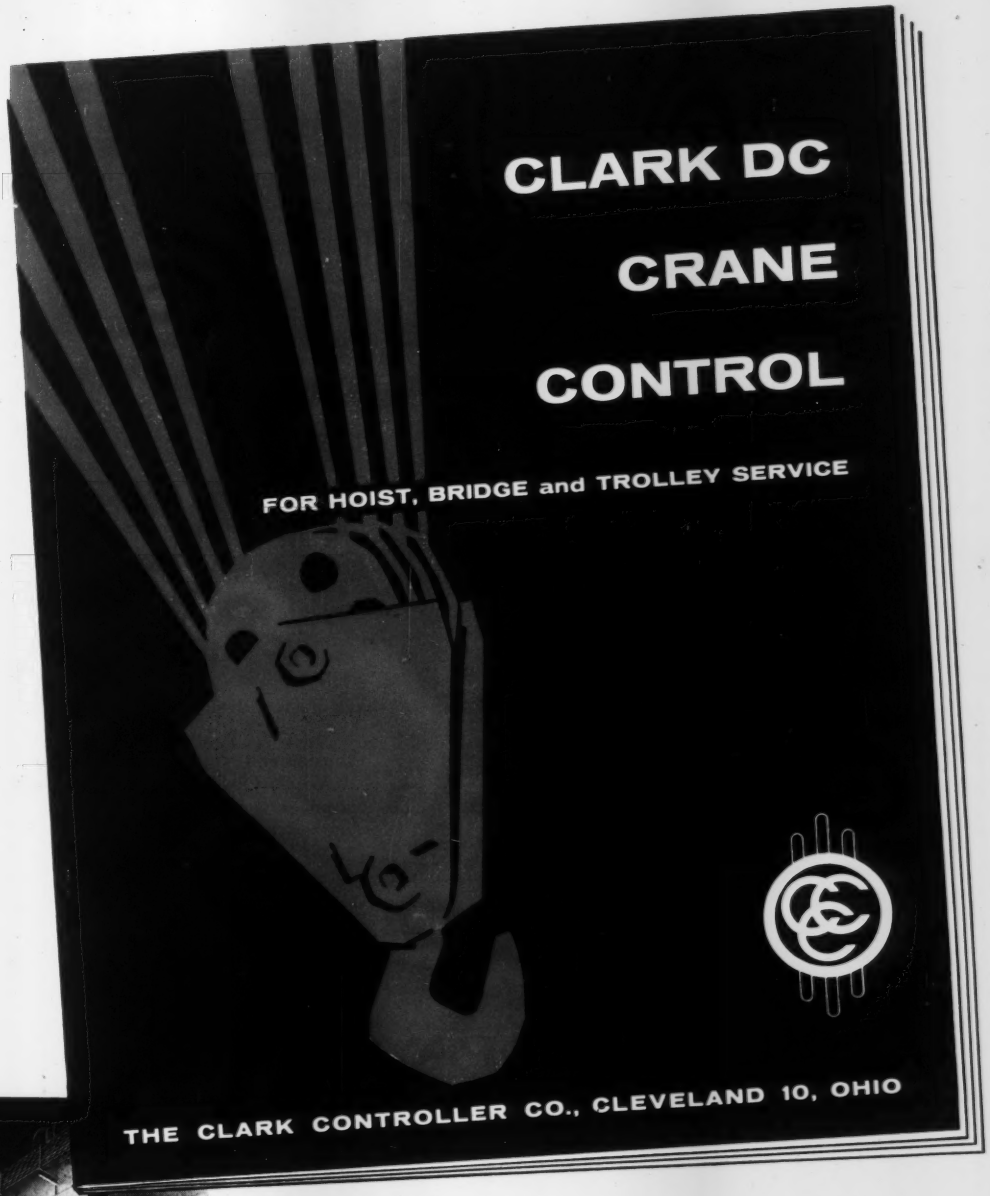

Clark has engineered and built control systems for all sizes and types of DC cranes, covering all five NEMA I.C1-42.01 Service Classifications. The hot ladle crane illustrated is an example of Group V, Steel Mill and Heavy Industrial.

Interested in DC Cranes?

This 20 page book outlines the basic principles of DC crane control, and provides the essential technical information you should have to select the controls best suited to your particular DC crane requirements. Profusely illustrated with photographs, charts and diagrams, the book explains in detail the circuits and components required for safe, dependable crane operation. As a major supplier of DC control of all types for over 30 years, The Clark Controller Company has pioneered and developed many of the advancements in modern DC crane control. This book provides an authoritative report of these developments.

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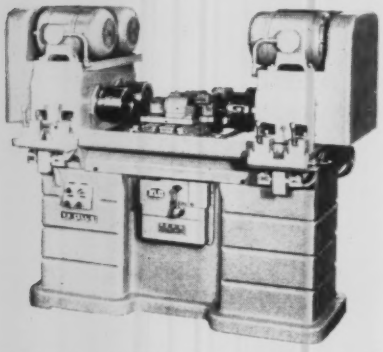
Only One Machine But Six Operations



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57-87

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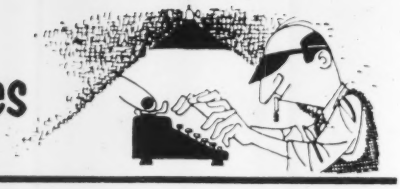
behind the scenes



Top of the Mornin'

This week's STEEL is dated Mar. 17, and surely our ancestors would lift their ghostly eyebrows if we made no mention of it. Some persons regard Mar. 17 as a 24-hour respite in the gloomy season of Lent; others take it as an excuse to be Irish for a day, a startling ambition not fully understood by the English. In any event, today is Saint Patrick's Day, so let's be off:

Saint Paddy was an artful lad;
Aye, lively, quick, and shrewd;
When stalled by grinning leprechauns
And scientific druids,
He fetched the harp from Tara's Halls
And ordered it re-strung;
He told the harper, "Go, man, go!
"I want this music swung!"
At once, from every rock and hole
The serpents they erupted,
And leprechauns and druids cried,
"This act, we won't disrupt it!
"Your magic rid us of our snakes,
"Yet jumpin' jive you've brung us;
"So welcome, sir—we're mighty glad
"You've settled down among us!"

Editors Take Course in Art

In the interest of readers who are curious about goings-on behind the scenes at STEEL, we attended a staff meeting last week. Copy Editor Harry Chandler, in his capacity as chairman, informed the eager group that he had invited Artists Tom Bryan, Tom Welsh, and George Farnsworth to say something interesting about STEEL's philosophy of presentation. Speaking in soothing tones, almost as if he were addressing spirited horses, Harry encouraged the artists to speak up. A respectful hush fell over the assembly as Tom Bryan took the floor.

"It's the first 10 seconds that count," Tom declared. "If the layout, illustration, title, and deck don't catch the reader's attention in that interval, we won't have to worry about reprinting it." He spoke with a great deal of authority about the principles of layout and their effective use in a communication technique termed Tell-Graphic—a smooth blend of pictures and words that conjures up the gist of a story for the busy reader.

George Farnsworth explained that our covers are, and of right ought to be, billboards. "They advertise what's inside," he said.

He confessed that artists are not allowed to be timid, or sensitive, or easily hurt. Moreover, to be successful, artists must be ready at all times to accept editorial counsel and advice. (Of course, the lump in his cheek could have been tobacco.)

Tom Welsh told the editors that artists need time to make acceptable and effective editorial presentations. He said that some persons weren't impressed by tables and charts because information in those guises could be terribly dull. For his part, however, he was just nuts about charts and tables, and it was fortunate, too, because he was required to mess with charts and tables all the time.

Art Director Bill Kellogg added that he couldn't stand the sight of photographs without captions, and Editor Walt Campbell remarked that, all in all, STEEL was singularly blessed with its art staff. He said this with the air of a man who is continually astonished at the sight of artists behaving just like people.

When Pigs Isn't Pigs

In the March, 1958, issue of *Better Castings*, a production of Continental Copper & Steel Industries Inc., Vice President Herbert O. Jarvis took over the front cover to indulge a whimsy—a whimsy with a hard core of sense. The following letter, he said, was received and put into the *Congressional Record* by Sen. Barry H. Goldwater (R., Ariz.).

"Dear Mr. Senator:

"My friend Bordeaux over in Pima County received a $1000 check from the government this year for not raising hogs. So I am going into the not-raising-hogs business next year. What I want to know is what is the best kind of farm not to raise hogs on, and what is the best kind of hogs not to raise? I would prefer not to raise razorbacks, but if that is not a good breed not to raise, I will just as gladly not raise any Berkshires or Durocs.

"My friend Bordeaux is joyful about the future of his business. He has been raising hogs for more than 20 years and the best he ever made was $400, until this year, when he got $1000 for not raising hogs. I plan to operate on a small scale at first, holding myself down to about 4000 hogs, worth about $80,000.

"Now, another thing. These hogs I will not raise will not eat 100,000 bushels of corn. I understand that you also pay farmers for not raising corn. So will you pay me anything for not raising 100,000 bushels of corn not to feed to the hogs I am not raising?

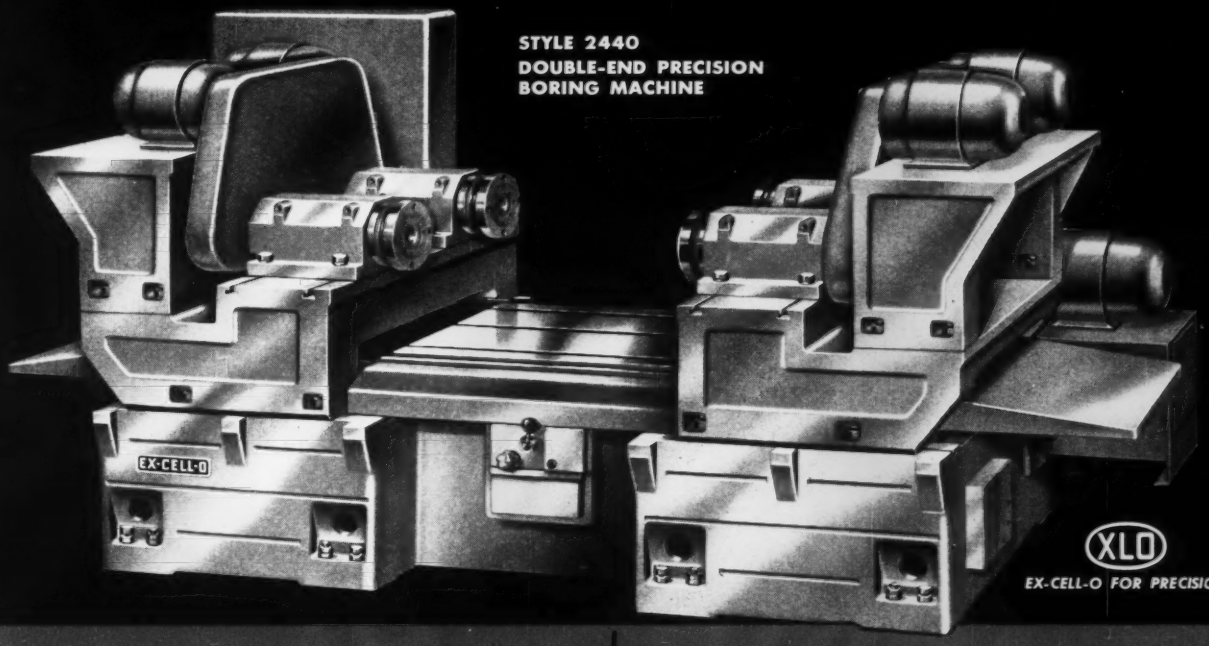
"(Signed) Octave Broussard."

Mr. Jarvis adds this postscript: "If anyone of our friends has any ideas how I can get the government to pay me for not producing alloys, I would like to hear from them."

Shrdlu

(Metalworking Outlook—Page 37)

announcing



STYLE 2440
DOUBLE-END PRECISION
BORING MACHINE

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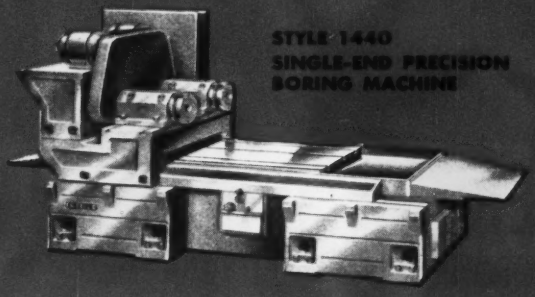

STYLE 1440
SINGLE-END PRECISION
BORING MACHINE

TWO NEW HEAVY DUTY PRECISION BORING MACHINES

57-76

EX-CELL-O BORING MACHINES perform better because of deep-down solid construction, high precision and exceptional versatility. The minute you put one to work profits go up, operating costs go down. And these two new additions to the Ex-Cell-O line are no exceptions:

DOUBLE-END STYLE 2440: This new double-end Ex-Cell-O machine, designed for large workpieces, combines capacity and rigidity for bulky parts while allowing for multiple-station high production work on smaller parts. Spindle bridges can be moved together or spread apart to suit the workpiece.

SINGLE-END STYLE 1440: This new heavy-duty precision boring machine is identical to the 2440 (above) except that it is equipped with one bridge for single-end operations.

Whichever model fits your particular production requirements—you'll find their rugged versatility performs a wide range of rough, semi-finish, and finish operations which lowers your per-unit costs, increases your potential profit.

For further information, call your local Ex-Cell-O Representative. He'll provide all the facts about these two new machines. Or, write direct to Ex-Cell-O.

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> "Weirzin material provides a very good surface for maximum paint adherence, which is most important for an outdoor application such as ours.
>
> "High corrosion resistance is also of the utmost importance. Weirzin answers this requirement very well since it arrests any creeping of corrosion where the surface may become scratched or abraded in service. In other words, the corrosion will not tend to spread beyond the damaged area."

What about your products? Have you considered lately how they can be improved economically? Send for free brochure on Weirzin for both outdoor and indoor use. Write Weirton Steel Company, Department B-15, Weirton, West Virginia.

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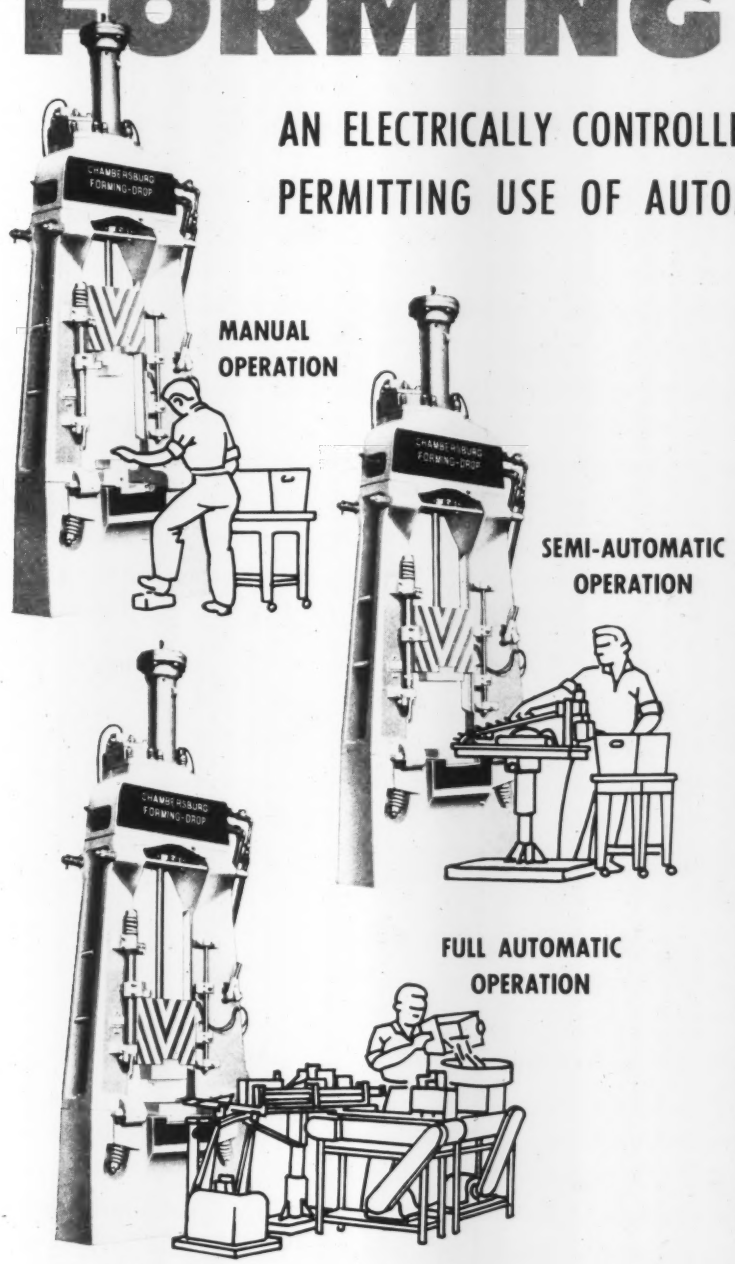
AN ELECTRICALLY CONTROLLED GRAVITY DROP HAMMER PERMITTING USE OF AUTOMATIC FEEDING DEVICES–



THIS NEW HAMMER, the result of original research and development by the Chambersburg Engineering Company, is especially designed for precision blow control and the accommodation of automatic feeding devices to perform such operations as forming, embossing, coining and re-striking in a single die impression.

Precise blow control is achieved by maintaining close pressure tolerances on the air supply and by the fine adjustment of a regulating valve on the hammer's exhaust system. These two features combined in a Chambersburg-designed hammer structure result in a tool which offers faster, safer, effortless and more accurate production in operations requiring a single blow in a single die impression.

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Consult with Chambersburg engineers regarding the application of the Forming Drop and automatic feed to your job—or write for Bulletin 73-L-7.

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LETTERS
TO THE EDITORS

Objects to STEEL Statements

We object to two sentences in the article, "Mill Uses Fireproof Hydraulic Fluid" (Feb. 3, Page 117). You say: "Straight synthetic was ruled out. It is potentially toxic and can corrode some parts of a hydraulic system."

We are surprised that you would say this without checking the meaning of "straight synthetic" or the truth and significance of the second sentence. All hydraulic fluids—including the water-based products, the phosphate ester materials, the oil-emulsion class, and the hydrocarbon petroleum oils—present the same general toxicity problem depending on the conditions of use.

Our Pydraul fluids—described as phosphate ester base formulated fluids—could be called "straight synthetic." They have been tested toxicologically by two independent laboratories and found to be quite safe. They have been tested by known corrosion tests and have undergone 400 million hours of operations without corroding parts of any hydraulic system.

Every hydraulic fluid has some shortcoming: Oil is flammable. Synthetics have the disadvantage of high price. Water-base synthetics and water emulsions have temperature and pressure limitations.

M. C. Plummer
Manager, Pydraul Sales
Organic Chemicals Div.
Monsanto Chemical Co.
St. Louis.

Shaving the Cost Dollar

Your editorial, "Cost Crisis Competition" (Feb. 10, Page 41), is an excellent one and touches on one of the important means of lowering costs through savings in processing steel into finished products. We believe we can point out possibilities for tremendous cost reductions. Please send an awards kit so that we may prepare our data for your Cost Crisis Competition.

Gilbert D. Dill
Process Engineer, Steel Div.
Wheelabrator Corp.
Mishawaka, Ind.

STEEL Helps Reader on Job

A habitual STEEL reader, I look forward to receiving my weekly copy. It helps me do my work since it covers a number

(Please turn to Page 12)

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½ to 50 hp

RATIOS:
4:1—14:1—24:1 (or 20:1)

OUTPUT SPEED RANGE:
420 to 5 rpm

TORQUE RATINGS:
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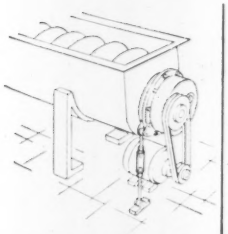
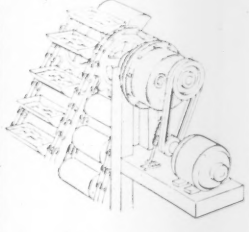
STEEL housing . . . will not fracture, serves only as protective cover and lubricant reservoir. Therefore, lubricant supply is safeguarded.

STEEL tie-rod and straddle-mounted tie rod brackets . . . are fastened to heavy steel frame by steel bolts in double shear.

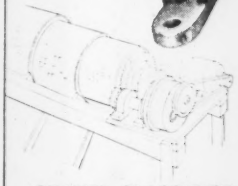
A FEW TYPICAL APPLICATIONS



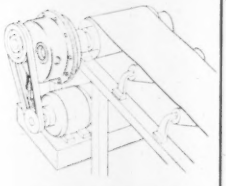
SCREW CONVEYOR



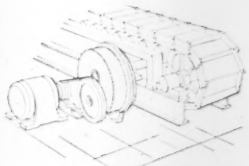
BUCKET ELEVATOR



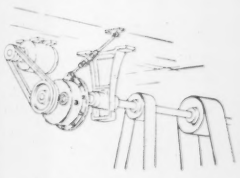
GRAVEL CLASSIFIER



BELT CONVEYOR



APRON FEEDER



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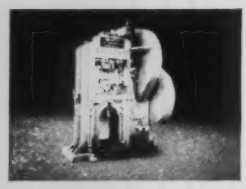
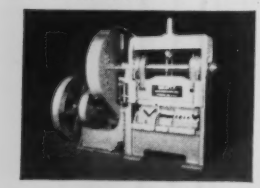


BEATTY No. 7 Detail Flange Punch speeds single hole flange punching; eliminates end-for-end turning of beams. 100-ton cap.



BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.

Got a metal-working problem? Chances are, from the Beatty family of metal-working equipment you will find the *right* machine for the job. Right in cost . . . right in production speed . . . right in engineering concept.

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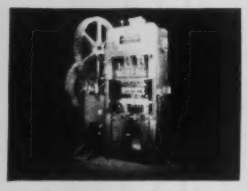
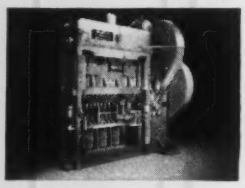
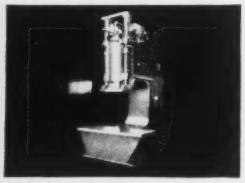


BEATTY Guillotine Beam Flange Punch for flange punching of beams. Built-in adjustable tools save set-up time. 200 ton cap.



BEATTY Guillotine Beam Punch punches webs and flanges in I-beams from 6 to 30 inches.



BEATTY Gap Type Press for forming, bending, flanging, pressing. 250 ton cap.

LETTERS

(Concluded from Page 10)

of topics, including costs, personnel, labor problems, and latest metalworking developments. Also, I enjoy reading the editorials.

E. A. Gilmore
General Superintendent
Mannesmann Tube Co. Ltd.
Sault Ste. Marie, Ont.

Shame on Editors!

Shame on the editors of STEEL for implying in the Mirrors of Motordom column of Feb. 24 (Page 49) that the beautiful Triumph TR-3 sports car pictured to the left fits the description on the right.

The car you are describing evidently is the four-passenger sedan, which is put to shame by its big brother, the TR-3.

Peter Robert Rentschler
Secretary
Hamilton Foundry & Machine Co.
Hamilton, Ohio

• *We goofed. You (and a score of other readers) are to be commended for your sports car knowledge.*

No Strings Attached

I would like to correct the erroneous statements about Research Corp. in the article, "Licensing: A Road to Profit" (Feb. 24, Page 46).

There are no patent "strings" attached to the grants-in-aid disbursed by our foundation to support basic research in colleges and universities. This function is kept separate from the activities of our Patent Development Div., which administers and licenses patentable inventions made in educational and scientific nonprofit institutions.

Further, we do not make grants to these institutions to develop these inventions to the commercial stage; this function is normally carried out by industrial firms under license.

H. Gordon Howe
Associate, Patent Development Div.
Research Corp.
New York

• *Sorry we erred in not separating the foundation's activities from those of the Patent Development Div.*

Welcomes Further Information

We would appreciate reprints of the five-part article, "How To Weld Copper and Its Alloys." We have found Part II (Feb. 24, Page 90) on shielded metal arc welding with a consumable electrode most helpful and will welcome further information along this line.

Robert R. Haley
Advance Aluminum & Brass Co.
Los Angeles

• • •

I would be pleased to receive reprints of this series.

M. A. Scheil
Director, Metallurgical Research
A. O. Smith Corp.
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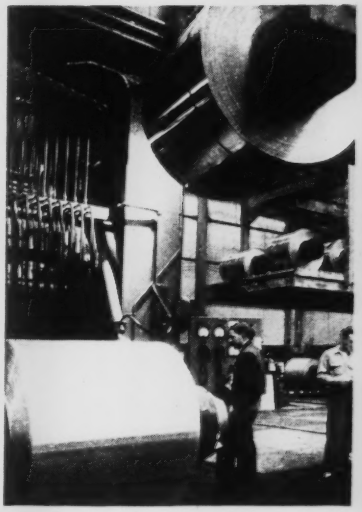

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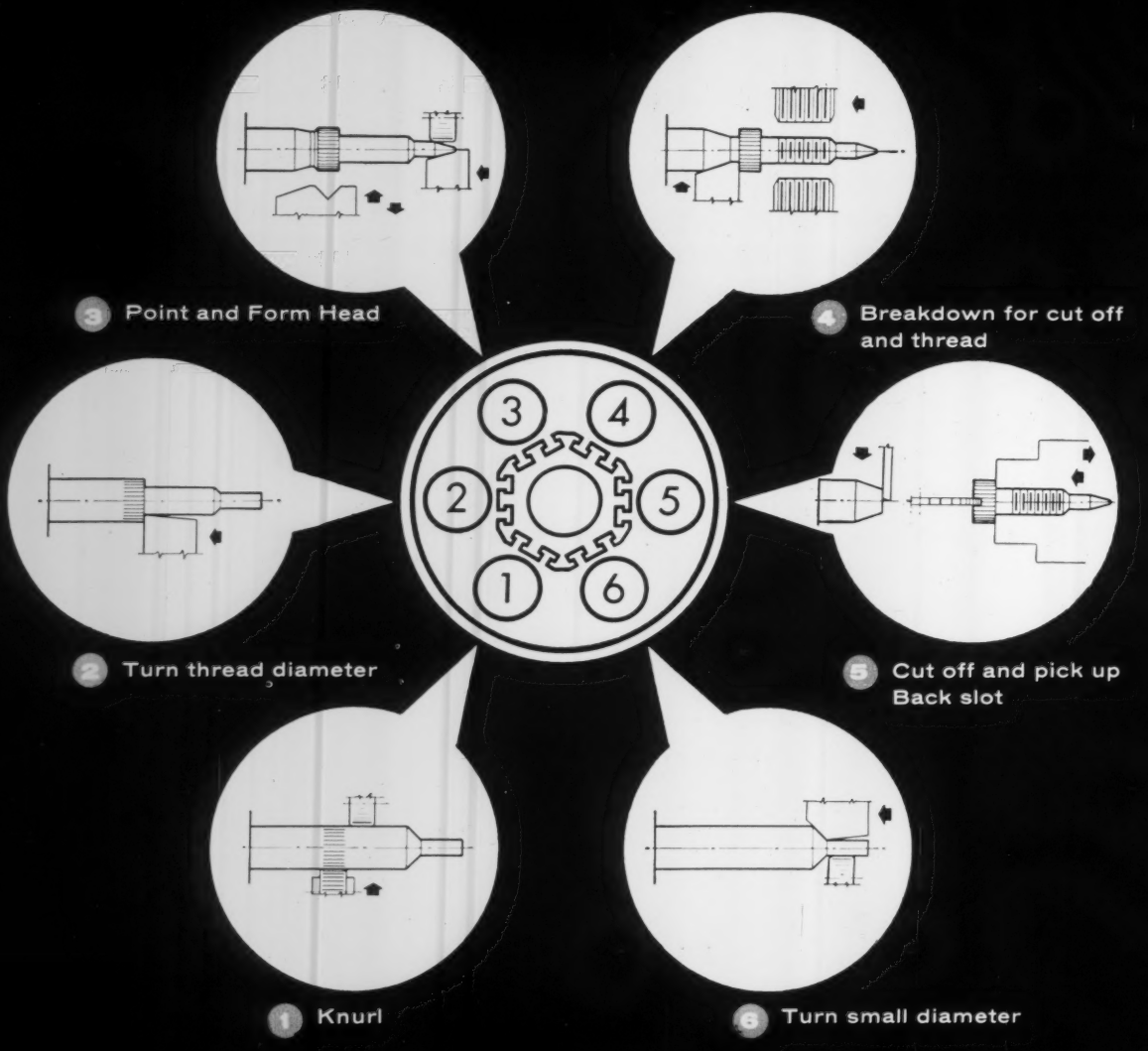

In this example of circumferential automation, 9 operations are performed in 3 seconds to complete this carbureter idle adjustment screw. This part and thousands of others, many more complex, are produced to close tolerances, at high speeds and low costs on Acme-Gridley automatics.

circumferential automation*

pioneered by National Acme, saves floor space, reduces machine tool investment, lowers machining costs.

* Each spindle on an Acme-Gridley Automatic is an efficient work station where pre-sequenced operations are performed in succession without manual attention. This is automation . . . circumferential automation.

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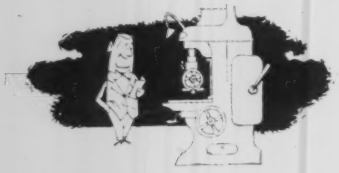

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MEET and exchange ideas with management, engineering, production, sales people from the nation's leading industrial concerns.

INSPECT the modern equipment and up-to-the minute manufacturing methods being utilized in booming Delaware Valley plants.

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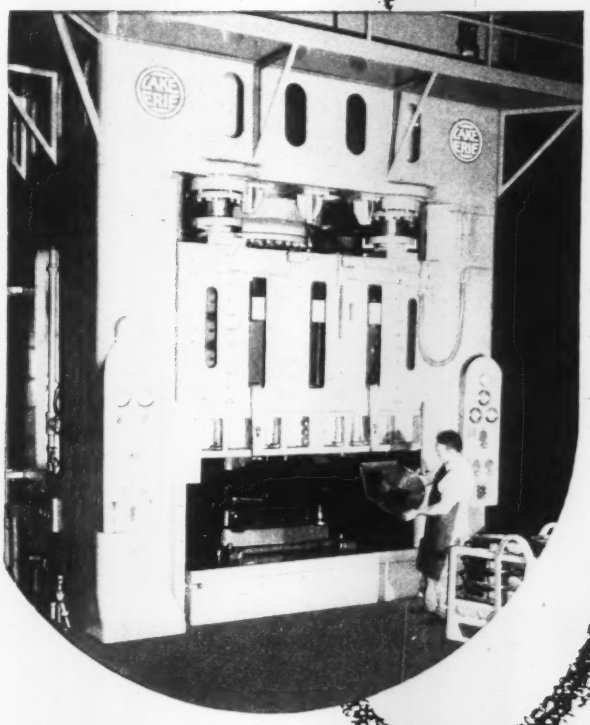

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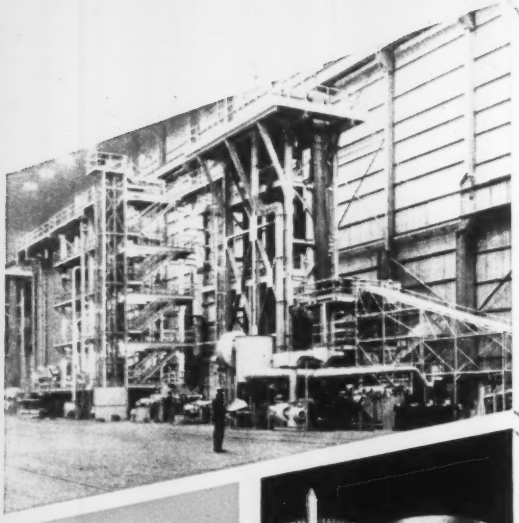

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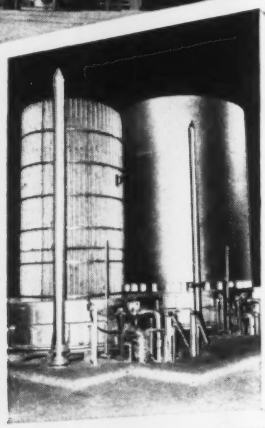

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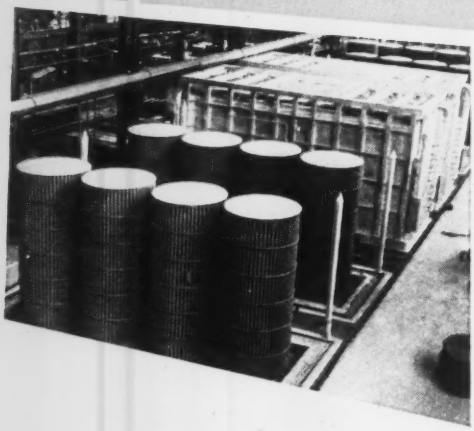
CONTINUOUS STRIP GALVANIZER



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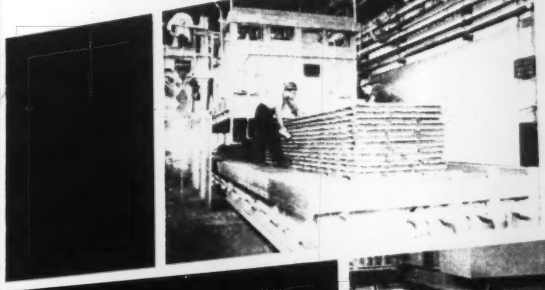

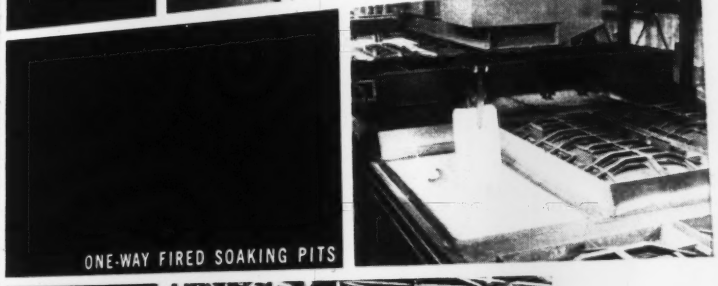

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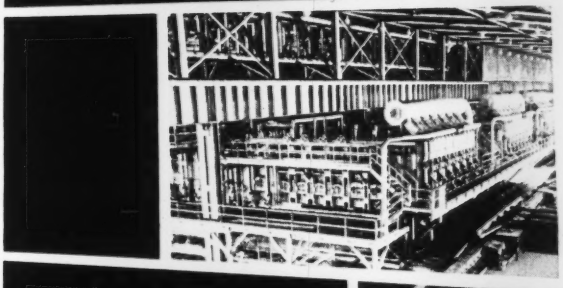

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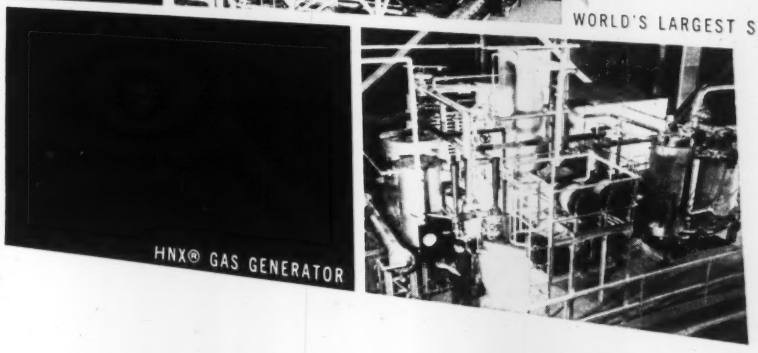

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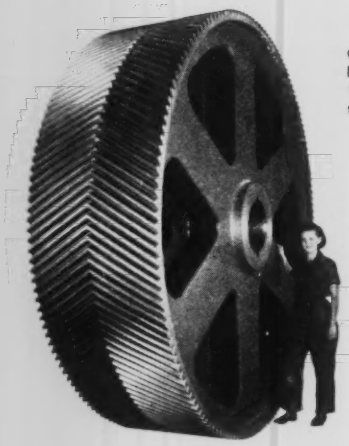
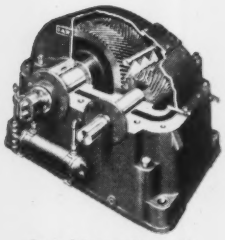
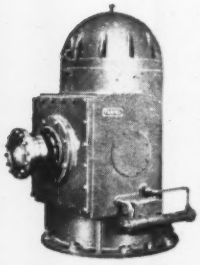


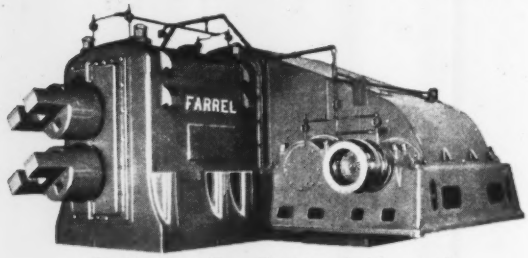
Continuous - tooth herringbone gear, 126.942" diameter, 36" face.



Speed-increasing unit with cover cut away to show gearing.



Vertical right-angle drive.



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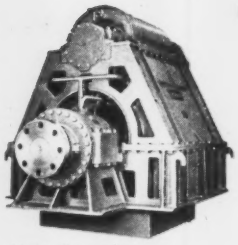
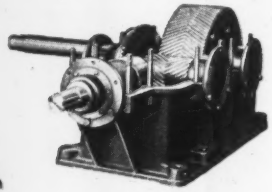
Farrel gear units are proven by years of practical experience in the application of mechanical drives in all types of power transmission.

Specialists for many years in the manufacture of heavy-duty gears and gear units, Farrel operates eight of the largest gear generators in the world and has a laboratory for gear research which is one of the most modern and completely equipped of its kind. Because the facilities of the company are complete, quality is under close control through all steps of manufacture, from the production of castings and weldments to completion of the finished product.

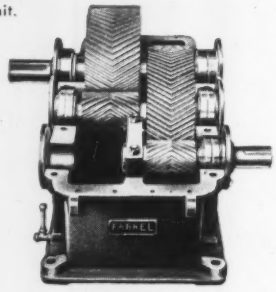
Write for details of any of the units shown.



Vertical marine propulsion unit.



Horizontal right-angle unit.



Typical double-reduction assembly.

FARREL-BIRMINGHAM COMPANY, INC.

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Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, Boston, Akron, Ann Arbor (Mich.), Chicago, Minneapolis, Fayetteville (N. C.), Los Angeles, Salt Lake City, Tulsa, Houston
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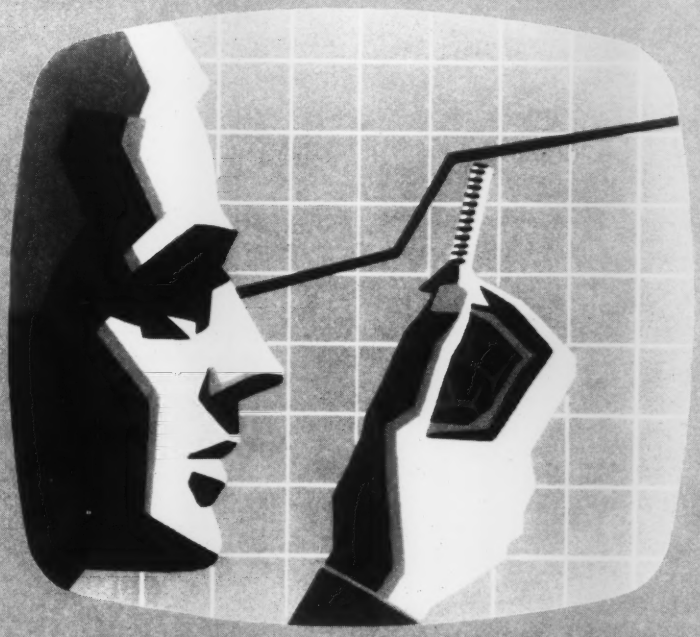
Farrel-Birmingham®

FB-1125

This membership seal means



consistent good quality in PHILLIPS CROSS-RECESSED HEAD SCREWS

Manufacturers of Phillips Cross-Recessed Head Screws who are entitled to the above seal do a good deal more than compete in selling these famous fasteners. They share quality control methods that bring worthwhile advantages to your assembly operations.

Consistent good quality fasteners for your product from these reliable sources are assured by common adherence to precision accuracy of dimensional standards, inspection gauges and gauging methods established by the Phillips Cross-Recessed Head Standards Committee sponsored by Screw Research Association.

You can rely upon these sources for product reliability which assures correct mating fit between recess and driving point. This eliminates driver slippage and prolongs driver and bit life, improves product appearance and reduces your costs.

Members of Screw Research Association...

You can rely on these sources . . . for product reliability

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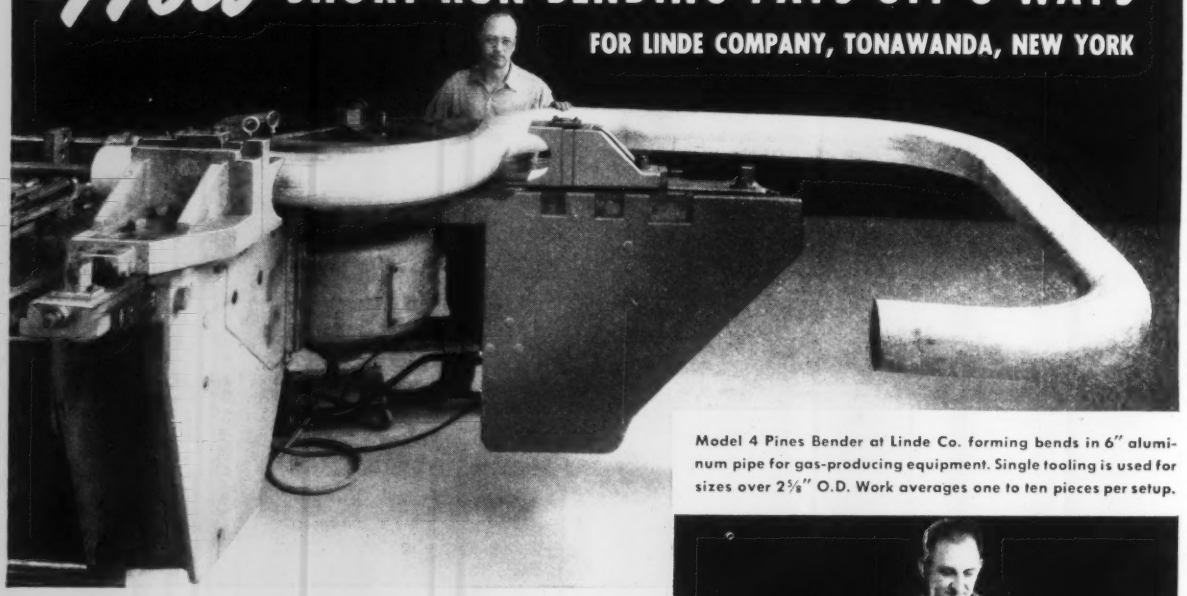
SEE OUR EXHIBIT BOOTH 1317, ASTE EXPOSITION, MAY 1-8, PHILADELPHIA

How SHORT-RUN BENDING PAYS OFF 3 WAYS

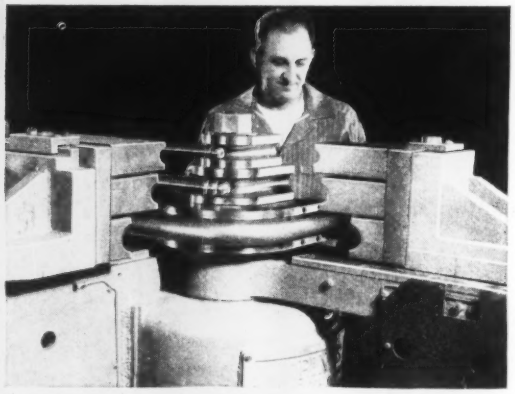
FOR LINDE COMPANY, TONAWANDA, NEW YORK



Model 4 Pines Bender at Linde Co. forming bends in 6" aluminum pipe for gas-producing equipment. Single tooling is used for sizes over 2⅝" O.D. Work averages one to ten pieces per setup.

Diverse Jobs Now Handled on Two PINES Machines

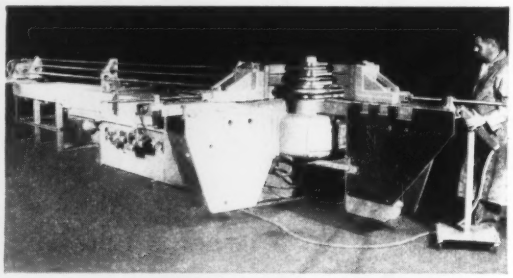
Here's another example of how extremely short runs can be handled efficiently and profitably on Pines Bending Machines. At Linde Company, Division of Union Carbide Corporation, Tonawanda, New York, a large Pines Model 4 and a medium-sized Model 2 Machine are now employed to make bends in a variety of copper alloy, stainless steel, and aluminum tubing. Tube sizes range from ½" up to 6" O.D. Lots average from one to ten pieces per setup. Results show a three-way saving. A large number of costly fittings previously used in fabricating oxygen and inert gas equipment has been eliminated. This, in turn, has effected a substantial reduction in the number of welding operations required. In addition, the facility for making bends quickly and as required has made possible a substantial reduction in inventory investment.



View of stacked die tooling which permits individual bending of three different tube sizes (1⅝", 2⅛", 2⅝" O.D.) without tool changes. Simple machine settings handle different angle requirements.

Multiple Dies Minimize Setup Time

As illustrated, for work up to 2⅝" O.D., a number of multiple stacked dies are employed which substantially reduce setup time. Tools are designed for interchangeability between the Model 2 and Model 4 machines. This permits handling as many as seven different tube sizes without a tool change. The ability to handle different bend angles that a given job may require by simple settings on the machines, contributes also to the efficiency the Linde Company has achieved in handling their requirements.



Over-all view of Model 4 machine equipped with three mandrels and stacked dies. Selection of standard radii also minimizes tooling and setup requirements over a wide range of sizes.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery · 662 WALNUT · AURORA, ILLINOIS

PRODUCTION BENDING · DEBURRING · CHAMFERING MACHINERY

FREE CASE STUDY DATA

Ask your Pines representative for assistance in analyzing your present bending methods. There is no obligation. Or, write today for additional facts and case study data on the cost-cutting advantages of production bending.

CALENDAR OF MEETINGS

Mar. 17-18, Steel Founders' Society of America: Annual meeting, Drake Hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Mar. 17-19, Atomic Industrial Forum Inc., and National Industrial Conference Board Inc.: Joint atomic energy management conference, Palmer House, Chicago, Information: AIF, 3 E. 54th St., New York 22, N. Y., or NICB, 460 Park Ave., New York 22, N. Y.

Mar. 17-20, American Society of Mechanical Engineers: Aviation division conference, Statler-Hilton Hotel, Dallas. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 17-21, National Association of Corrosion Engineers: Annual conference and exhibition, Civic Auditorium, San Francisco. Association's address: 1061 M & M Bldg., Houston 2, Tex. Executive secretary: A. B. Campbell.

Mar. 17-21, Nuclear Congress and Atomic Industry Trade Show: International Amphitheatre, Chicago. Information: International Atomic Exposition Inc., 12 S. 12th St., Philadelphia 7, Pa.

Mar. 19-21, American Management Association: Special conference on product development, LaSalle Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Mar. 19-21, Electronic Industries Association: Spring meeting, Statler Hotel, Washington. Association's address: 1721 DeSales St. N.W., Washington 6, D. C. Secretary: James D. Secrest.

Mar. 19-21, International Acetylene Association: Annual convention, Bellevue-Stratford Hotel, Philadelphia. Association's address: 205 E. 42nd St., New York 17, N. Y. Secretary: H. F. Reinhard.

Mar. 20, National Industrial Conference Board Inc.: General session for all associates on "The Financial Outlook," Statler-Hilton Hotel, Dallas. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Mar. 25-28, Packaging Machinery Manufacturers Institute: Convention and show, Atlantic City Auditorium, Atlantic City, N. J. Institute's address: 60 E. 42nd St., New York 17, N. Y. Executive director: Russell L. Sears.

Mar. 27-28, American Hot Dip Galvanizers Association: Annual meeting, Penn-Sheraton Hotel, Pittsburgh. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Mar. 31-Apr. 2, American Management Association: Special conference on purchasing, Palmer House, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Rubatex Gaskets meet special Kelvinator requirements

Rubatex closed cellular structure gives Kelvinator engineers just what they want . . .

"a non-moisture absorbing material . . . one that has sufficient resiliency to permit a firm, quiet door closure . . . plus a gasket that can be depended upon for a tight effective seal against loss of cold and entry of warm, humid air."

In addition to these important features, Kelvinator engineers also use Rubatex because it is convenient to work with and easy to apply in the assembly process.

Used as freezer door gasketing in '57 line — continued in Kelvinator '58 line

The principal application of RUBATEX in Kelvinator's combination refrigerator-freezer is a continuous gasket completely surrounding the freezer opening, on top, bottom and both sides.

This is a Closed Cellular Rubatex stock (No. G-251-C) especially developed in a light gray to give a fresh look and to blend beautifully with the metal door.

PIONEER MANUFACTURER OF CLOSED CELLULAR RUBBER

Rubatex Division, Dept. S-3
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Just fill out and mail for free sample and more information about Rubatex Closed Cellular Rubber Gasketing.

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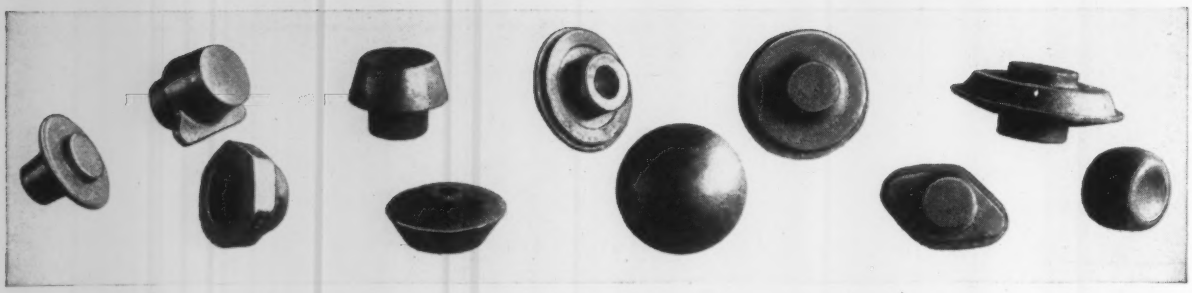
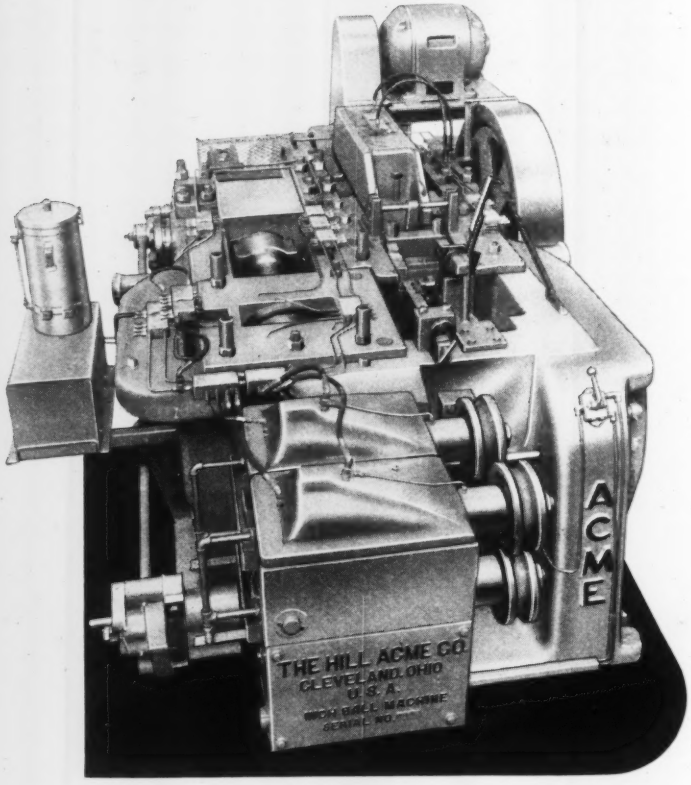


Typical Shapes Produced by ACME Single Blow Forging Machines

SINGLE BLOW FORGINGS
AT 135 PER MINUTE

One man operating this ACME single blow solid die forging machine is producing 135 one inch hard steel balls per minute from 11/16" stock. Automatic feed rolls carry bar stock at proper speed for maximum efficient operation. Adequate safety devices prevent jamming of the die.

ACME solid die forging machines are rated according to the size ball they will forge. Machines are built from 1" to 5" capacity.



Complete information is given in Bulletin SB-57.

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HILL ACME TOOLS OF INDUSTRY

Manufacturers of: "ACME" FORGING • THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BAR-BILLET SHEARS
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Quality in Ascendancy

The superiority of the vast number of products that are—and can be made from Roebling Cold Rolled Flat Spring Steel is a fact known throughout all industry.

You pay for mechanical and dimensional uniformity when you buy flat spring steel...you *get* it when you buy Roebling.

For information on how our products can help *yours*, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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Branch Offices in Principal Cities

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Roebling...Your Product is Better for it

VICTOR R. BROWNING
MILL TYPE CRANES

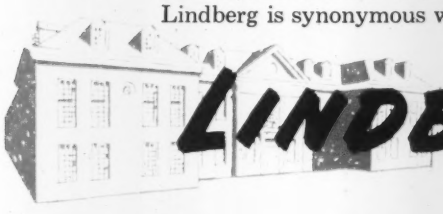
to Specification..

Basically designed as required by A.I.S.E. specifications, mill type cranes built by Victor R. Browning & Co., Inc. also offer the opportunity of specifying preferences and standards prevailing in the purchaser's plant. May we have your next inquiry?

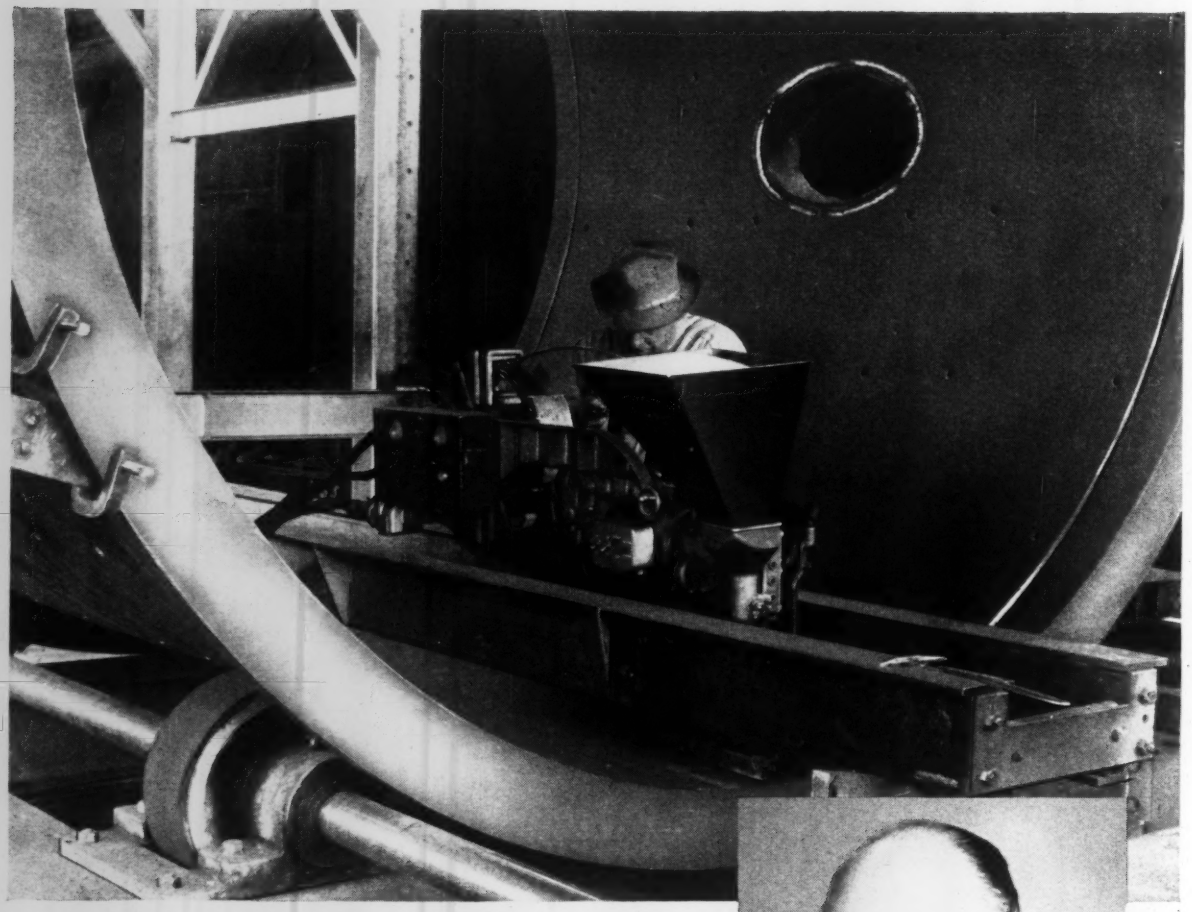
VICTOR R. BROWNING & COMPANY, Inc.
WILLOUGHBY (CLEVELAND), OHIO
DESIGNERS AND BUILDERS OF ELECTRIC OVERHEAD TRAVELING CRANES AND HOISTS AND ELECTRIC REVOLVING CRANES

How to find a better heat-treating method

Here's a sound way to do it. Take your problems to the people who have consistently, over the years, provided the metal treating industry with new and better ideas, more efficient, more practical equipment. This will bring you to Lindberg, creators of the famous Cyclone type atmosphere furnaces, the long-life "dimple" vertical radiant tube, the revolutionary new CORRTHERM electric heating element and so many other innovations in better heat treating methods. Lindberg is synonymous with heat treating furnaces. We build them for carbonitriding, carburizing, hardening, tempering, normalizing, bright stainless annealing, brazing, carbon correction, nitriding, or any other metal treating requirement. Give your production processes the advantages of Lindberg's forward look in "heat for industry" techniques. Get in touch with your nearest Lindberg Field Representative (See classified phone book) or write Heat Treating Furnace Division, Lindberg Engineering Company, 2441 W. Hubbard St., Chicago 12, Illinois.



LINDBERG heat for industry



Many of Mine and Smelter's Marcy grinding mills are equipped with Standard Steel flange rings, shown above. No flange ring replacements have ever been required. Some of these mills have been operating 24 hours a day for more than 15 years.

"'Dependability' is the keyword in our very fine relationship with Standard Steel"

We at Standard are happy indeed that Mine & Smelter Supply Co.'s chief engineer, J. R. Grout, appreciates the efforts we have gone to over the years to combine dependable service with our know-how and quality standards.

We consider it our responsibility to help maintain the world-wide reputation for quality mining and industrial equipment which Mine & Smelter Co.'s Marcy Mill Division enjoys by providing this customer with the same fine service it renders, in turn, to *its* customers.

Won't you discuss your needs for weldless rings, flanges, forgings and castings with us. You will appreciate our personalized service. Write Dept. 2-C.

"Standard Steel for many years has been supplying our company with shell flange rings, as well as riding and roller tires for use on our Marcy Grinding Mills and other rotary-type equipment. Their product quality and cooperation have helped make it possible for us to serve our customers promptly—our company policy. I believe the word 'dependability' is the keyword in our very fine relationship with Standard Steel," says Joseph R. Grout, chief engineer, Marcy Mill Division, Mine & Smelter Supply Co.

Standard Steel Works Division

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BURNHAM, PENNSYLVANIA

Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes

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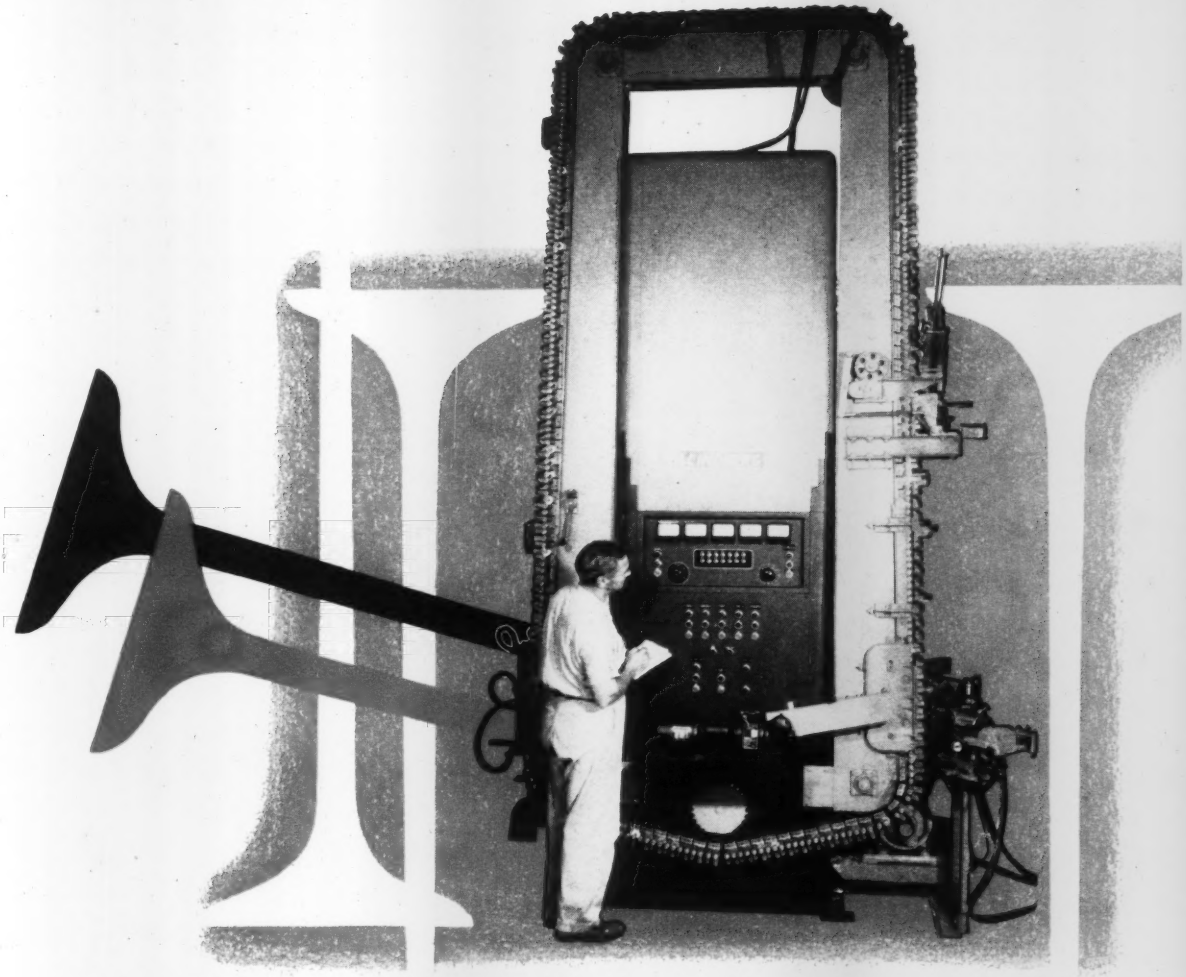
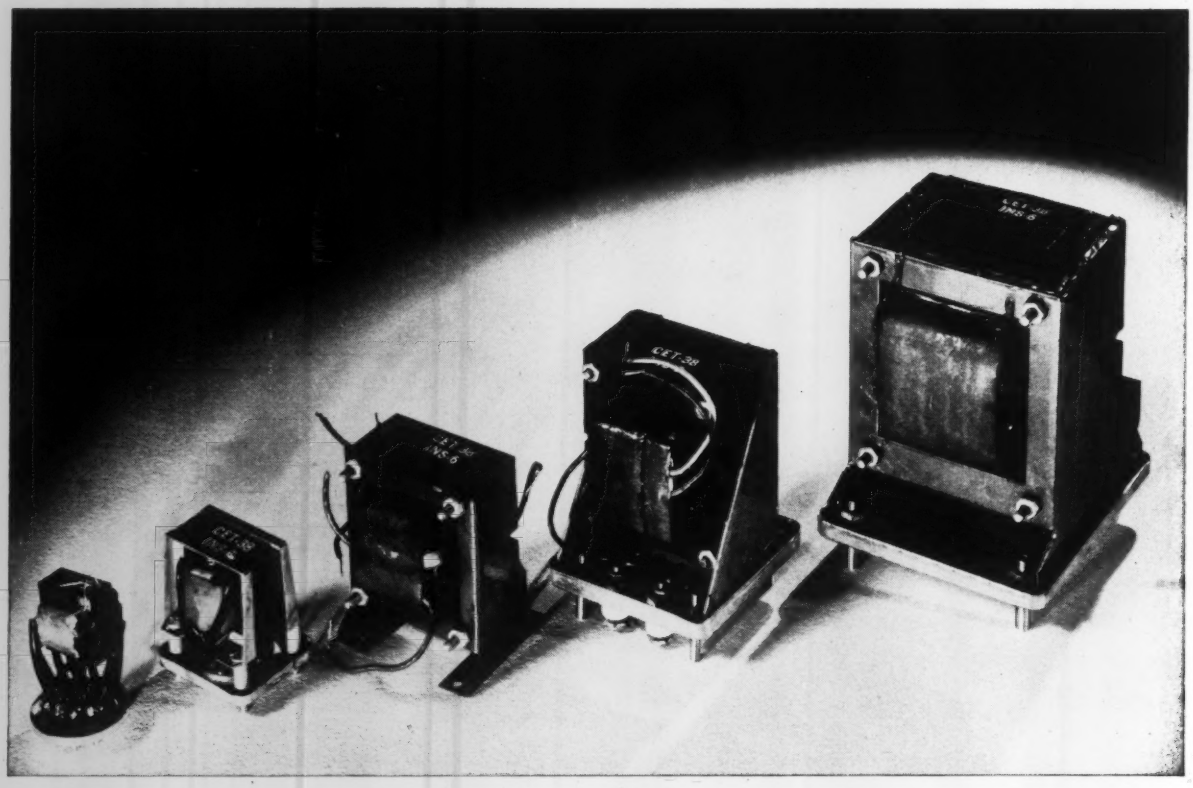


Lindberg pioneers in High Frequency Heating

Along with its pioneering in all phases of "heat for industry" Lindberg is one of the largest makers of High Frequency heating units. Our "H-F" designers and engineers have made outstanding developments in this important heat treating field. For example, we illustrate a remarkable unit just recently completed for aluminizing automotive valves. It was designed vertically, saving 60% of floor space, and is completely automatic. No operator is required. It fits perfectly into an automated production line.

Our High Frequency Division provides units for hardening, brazing, heating for forging and forming, annealing and many other processes, and designs a variety of fixtures for application to "H-F" units. Lindberg also supplies a complete line of motor generators for all induction heating and melting applications. Get in touch with your nearest Lindberg Field Representative (See classified phone book) or write High Frequency Division, Lindberg Engineering Company, 2111 W. Hubbard St., Chicago 12, Illinois.

LINDBERG heat for industry



A Transformer becomes a precision device with Allegheny Magnetic Materials in the core

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"TRANSFORMER LAMINATIONS"

84 pages of valuable technical data on standard and custom-made laminations from all grades of Allegheny Ludlum magnetic core materials. Prepared from carefully checked and certified laboratory and service tests—includes standard dimensions, specifications, weights, etc. Sent free on request . . . ask for your copy.

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★ ALLEGHENY SILICON STEEL
★ ALLEGHENY 4750
★ ALLEGHENY MUMETAL

The operation of a transformer is no better than the magnetic core around which it is built. With Allegheny magnetic materials in the core, you get the *best*—uniformly and consistently.

Sure there are reasons why! For one thing, there's the long experience of a pioneer in development and quality control of electrical alloys. But most important, the A-L line offers complete coverage of any requirement you may have, any service specification. It includes all grades of silicon steel sheets or coil strip, as well as Allegheny Silectron (grain-oriented silicon steel), and a wide selection of special high-permeability alloys such as Allegheny 4750, Mumetal, etc.

In addition, our service on magnetic materials includes complete lamination fabrication and heat treatment facilities. What's more, this extensive experience in our own lamination stamping department is a bonus value for all users of A-L electrical sheets or strip. ● Let us supply *your* needs. *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.*

STEELMAKERS to the Electrical Industry

Allegheny Ludlum

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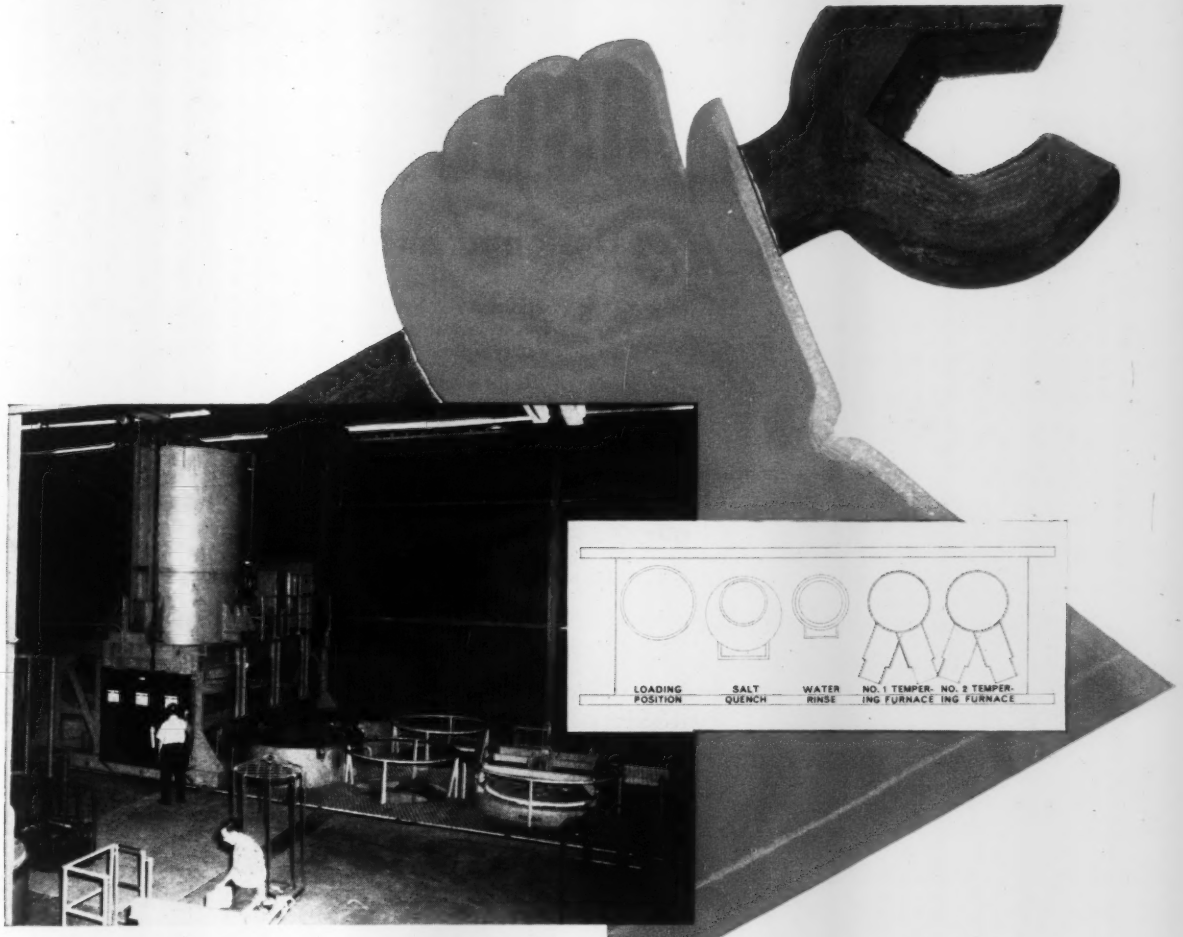
AL® STEELS FOR THE ELECTRONIC AGE



Lindberg applies the creative touch to field-installation

Here is an example of Lindberg's creative touch in field-installed heat treating equipment. Our unique design of this movable overhead furnace saved space, labor and time and increased quality and operating efficiency in missile manufacturing. We have the technical staff and the experienced engineers to design and install for you any requirement you may have for the application of heat to industry. Our service covers all types of heat treating furnaces, aluminum melting and holding furnaces, high frequency units, ceramic kilns, controls and all facilities required to fit this equipment into your production processes. We specialize in "turn-key" operations covering everything from design and engineering to the finished job installed in your own plant. Whatever your industrial heating problem, a good way to solve it is to talk it over with Lindberg. Just get in touch with your local Lindberg Field Representative (See classified phone book) or write Lindberg Industrial Corporation, 2321 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Avenue, at Downey, California.

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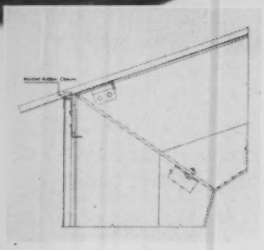
TRUSCON "BUDGET

Are Designed and Engineered for Fast,

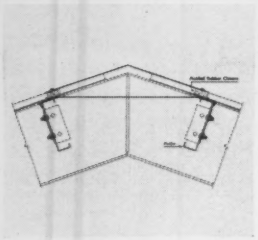
Top utility at lowest cost! That's the new Truscon Steel "Budget Building", designed to keep costs down and quality up!

Basic framework is of rigid frame design, shop fabricated from hot rolled structural sections, complete with all necessary connection plates and anchor bolts. Purlins and girts are cold formed channel sections, bolted with standard machine bolts.

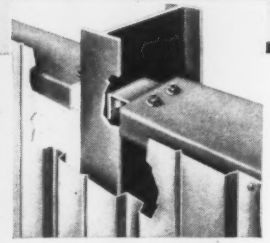
Roofing and siding are 26-gage galvanized roll formed ribbed sheets 24″ wide, and in continuous lengths. Sheets are rolled from Republic tight-coated,



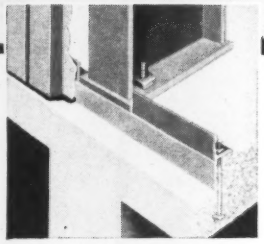
Section through eave showing molded rubber closure between siding sheet and roofing sheet. Also shown are eave strut connection and bracing connection to rigid frame.



Section through ridge showing molded rubber closure between rigid cap and roof sheet. Also purlin connection to rigid frame. Connections make building weathertight.



Section through sidewall at girt showing girt connection to rigid frame and fastening of sidewall to girt. Strong, sturdy building can be erected fast at the job site.



Section through sidewall at sill showing curb angle, rigid frame anchorage and siding detail. All connection plates, connection bolts and anchor bolts furnished complete.

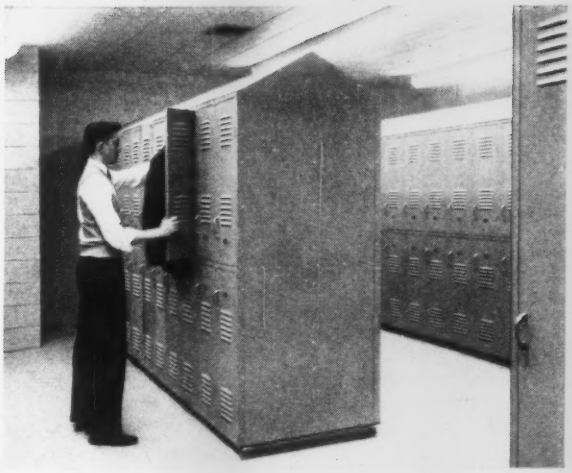
BUILDINGS"

Economical Job Site Erection

continuous hot dip galvanized steel . . . will not flake, crack or peel. More rust resistant than ever and no painting needed.

Truscon "Budget Buildings" are available for immediate delivery in widths of 32, 36, 40, 44, and 48 feet—12- and 14-foot heights, in any lengths necessary. Orders are filled fast from "off-the-shelf" stocks of pre-engineered materials. All roofing, siding, windows, doors and hardware are shipped to the job site as a package.

For additional information, send for attractive full color brochure, or call your Republic representative.



REPUBLIC STEEL LOCKERS are indispensable wherever clothing must be changed or stored. Safe, pilfer-proof, tamper proof. Wide selection of styles and locking mechanisms. Bonderized finish for lasting protection. And Republic's Berger Division will help you plan new or enlarged locker systems and installation details. Send coupon.

REPUBLIC ELECTRUNITE® E.M.T. offers several "the best costs less installed" advantages that mean significant savings in electrical raceway installations. "INCH-MARKS" simplify cutting and fitting, "GUIDE-LINE" keeps bends in correct plane, and "INSIDE KNURLING" makes wire pulling up to 30% easier. For additional information, write today.

REPUBLIC WEDGE-LOCK STEEL SHELVING is capable of exceptionally high stacking. Patented Wedge-Lock construction means that the heavier the load, the tighter the grip. Wedge-Lock features a post that will not buckle, a reinforced shelf that does not sag and a concealed sway-proof joint. Unlimited shelf arrangements. Send coupon for facts.

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- ☐ Republic Wedge-Lock Shelving
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- ☐ Republic Steel Lockers

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ANYWHERE A MAN CAN GO
THE NEW AIRCOMATIC® MIGet CAN WELD

Aircomatic MIGet Welding Gun and Control Panel. MIGet, 200 amperes, air cooled, handles one-pound reel of aluminum wire 3/64" to 1/16" and two-pound reel of hard wire .030" and 3/64" dia.

- **welds all weldable metals**
- **carries its own reel of wire**
- **operates up to 50 feet from control panel —with control panel 100 yards from power supply**

The new Aircomatic MIGet now makes it possible to weld practically anywhere a man can reach, climb or crawl.

The MIGet features its own compact, built-in reel of wire, high portability and overall light weight. Components of both the Aircomatic MIGet gun and Aircomatic MIGet Control Panel are miniaturized and simplified with sub-assemblies packaged to be replaceable as units.

Your welder may not be working in a crow's nest, but if the job is hard to reach, he'll reach it more easily than ever before and do the job faster with a new Aircomatic MIGet in hand.

Send today for technical literature on the Aircomatic MIGet. Or call your nearest Air Reduction Sales Office.

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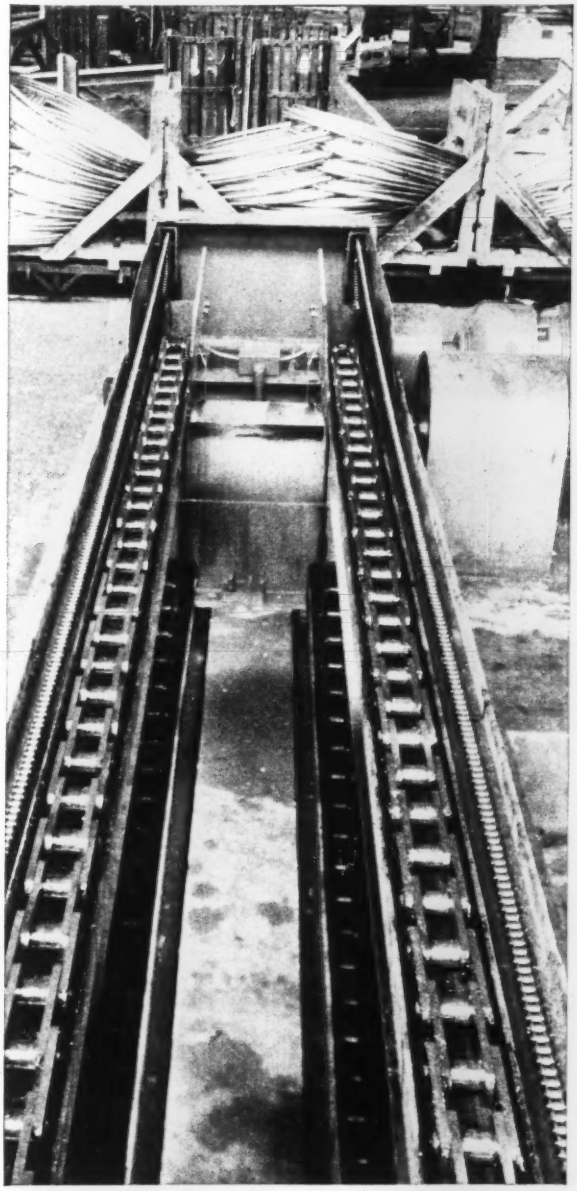
AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT • Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** – industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** – carbon dioxide – gaseous, liquid, solid ("DRY-ICE") • **OHIO** – medical gases and hospital equipment • **NATIONAL CARBIDE** – pipeline acetylene and calcium carbide • **COLTON** – polyvinyl acetate, alcohols, and other synthetic resins.

Link-Belt draw bench chains hold accurate pitch and sprocket contact



LINK-BELT 6-IN. PITCH SS-1326 CHAIN operates at speeds up to 400 feet per minute. Note strands of Link-Belt RC-80 roller chain which serve to return the gripper head back to the die stand so that another draw can be made.

Double strand SS-1326 bushed chain accommodates high operating speeds

This bushed type chain draws from one to five 130-ft. tubes at speeds up to 400 feet per minute on this 36,000-lb. draw bench. Design and structural features of Link-Belt SS class bushed chain make such high speeds possible.

Bushings perform operational function

Chain bushings play a major role in the operation of dual-chain draw benches. They engage a pair of pivoted hooks connected to the gripper head. The chain then pulls the gripper head and tubes through the die stand. When the draw is completed, the hooks are cammed away from the chain and the chain continues to operate.

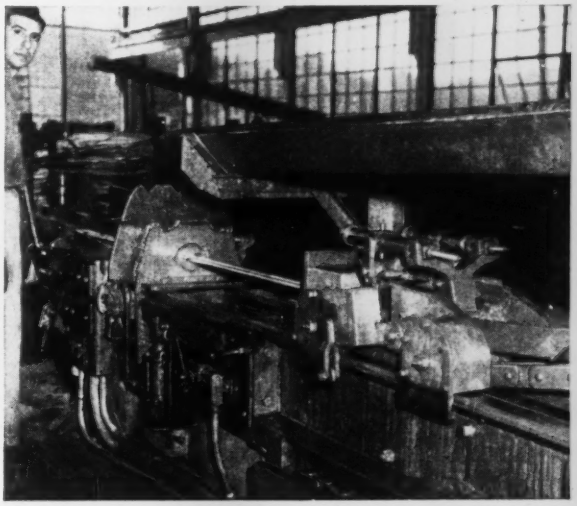
Structural advantages of bushed chain

Link-Belt SS class chain also offers rugged construction. The hardened steel bushings, securely fitted and locked in sidebars, give a durability and strength that permit even higher operating speeds than are possible with standard block chain.

Special machining of parts extends life of this draw bench chain

Whether it's for a 5000- or a 100,000-lb. bench, Link-Belt draw bench chains are built to last. Parts are accurately machined after hardening by a special process that assures longer chain life on even the highest chain pull applications.

SS class draw bench chains are available in a variety of pitches and strengths to suit any requirement. They are of all-steel construction, and well balanced. They are furnished in either bushed type or block link design. Close pitch control and correct sprocket contacting surfaces are maintained at all times.



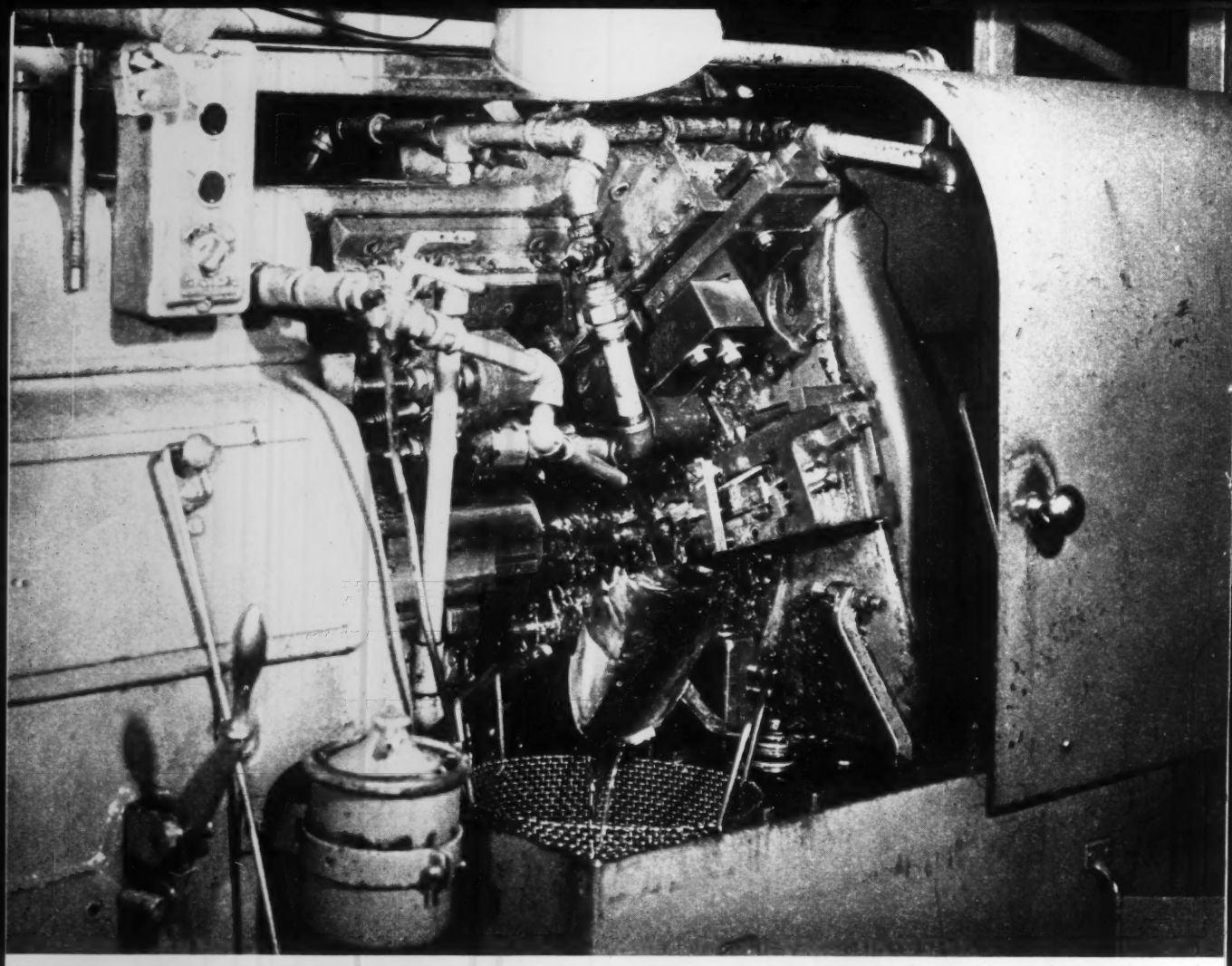
LINK-BELT SS-1325 CHAIN, 130 ft. long, is used on each of four draw benches in this copper tubing redrawing plant. Accurate control of raw materials and manufacturing processes is your assurance of close pitch and correct sprocket contact.

HEADQUARTERS for chains, sprockets and other Link-Belt conveying and mechanical power transmission products is your nearby Link-Belt factory branch store or authorized stock-carrying distributor.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,809



Here's how Transultex reduces automatic screw machining costs

Texaco Transultex Cutting Oil reduces the frictional heat at the chip-tool interface. This prevents chip welding, lengthens tool life and lowers power consumption.

Transultex is transparent, and stays that way in your machines. Inspection is easier. Machined surfaces stay clean, come out with a better finish. Which means fewer rejects, more production.

Texaco Transultex Cutting Oils are part of the complete line of Texaco Cutting, Grinding and Soluble Oils, all designed to help you increase production and lower costs. Simply call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

TUNE IN... Metropolitan Opera Radio Broadcasts Every Saturday Afternoon

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

Metalworking Outlook

New Market for Aluminum

The switch from liquid to solid fuels for missiles may mean growing markets for aluminum. Navy spokesmen say aluminum additives to solid fuels boost thrust 10 to 15 per cent. The amount of aluminum used is a military secret. It is supplied as a fine powder.

Will Ike's Recession Remedies Work?

STEEL can find little management enthusiasm for the antirecession measures proposed by the President. The public works projects wouldn't have any appreciable effect for at least eight or nine months; most executives think we'll be pulling out of the doldrums by then. Tax reductions can help, but chances are poor that a Democratic Congress will lower corporate levies. The cuts will come for individuals and on excises. That can ultimately aid business by stimulating consumer purchasing. Again, will such tax changes come in time? The economy needs a boost now.

Upturn Coming by Third Quarter

Some 40 per cent of metalworking companies responding to a National Industrial Conference Board survey estimate the low point in their new orders will come in the first quarter; 21 per cent guess the second period will be the nadir. But 41 per cent think a marked upturn in new orders will appear by the third quarter; 27 per cent think the turn will come by the fourth period. Some 11 per cent think it won't arrive until 1959's first quarter or beyond. The reports indicate that companies in the metal trades have been harder hit by the downturn than nonmetal industries.

Kefauver's Grandstand Play

Sen. Estes Kefauver's (D., Tenn.) declaration to the press that he wanted the Federal Trade Commission and the Justice Department to investigate steel prices has not been followed by a formal request to either agency. Neither appears anxious to initiate such a study on its own because of heavy case loads and a shortage of funds.

To Bolster Trade Act Chances

Look for the Reciprocal Trade Agreements Act to be extended for a year, including an amendment along the lines suggested by Sen. Hubert Humphrey (D., Minn.): A government "adjustment assistance" board would aid communities, workers, and industries "adversely" affected by trade policy. The President could authorize the board to: 1. Finance technical assistance to encourage diversification. 2. Ease tax provisions for new plants. 3. Encourage firms to relocate in distressed areas. 4. Extend jobless payments

another 26 weeks. 5. Counsel workers on relocation and give moving allowances.

Automated Building Block Tools

Hughes Aircraft Co. claims "the nation's first all electronically controlled line of machine tools." Designed and produced by Kearney & Trecker Corp. on the building block principle, the line turns out parts for armament control systems. Hughes's digitape controls are linked with milling, drilling, and boring machines to cut labor costs and skills required, eliminate setup time, and reduce tooling by 50 per cent.

Air Conditioning Gets Hot

Retail air conditioning sales should hit $3.5 billion in 1958, predicts Robert B. Gilbert of Rheem Mfg. Co. That compares with only $48 million in 1936. Sales of central residential systems should reach 175,000 units this year, vs. 140,000 last year, 170,000 in 1956, and 110,000 in 1955.

Autos of the Future

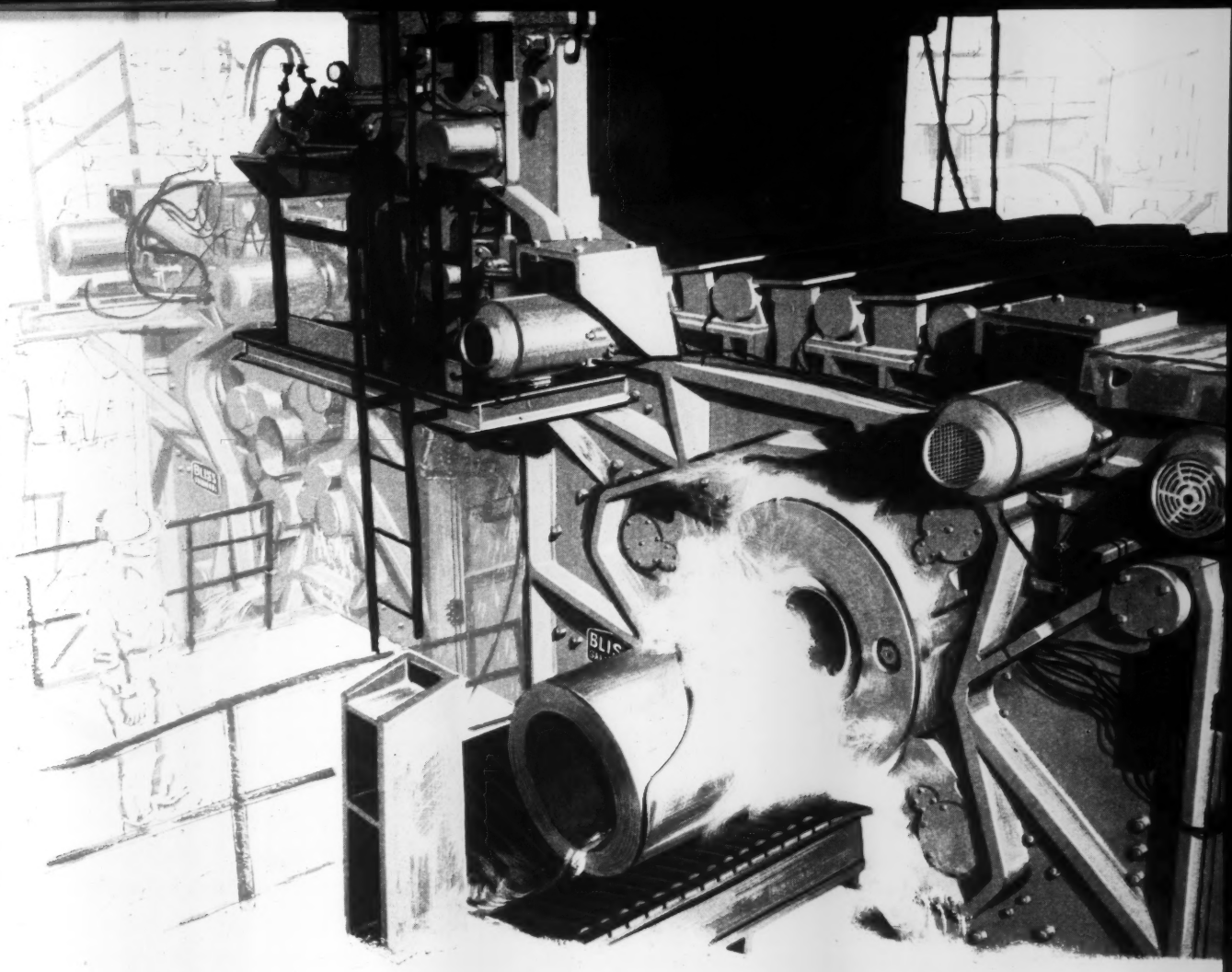
Where'll the small vs. luxury car dilemma of automakers lead? Louis Cheskin, Chicago motivational research executive, makes this prediction: Four-model markets will evolve—small cars, station wagons, luxury cars, sports cars. Other observations: Excessive chrome trim is gasping its last this year; all automakers will shift to unit body construction . . . As predicted last week in STEEL, Ford will build a small car for late 1959 introduction. It will be assembled at the Lincoln plant in Novi, Mich. A rear-end engine is still being considered. Chevrolet will probably introduce its small car at about the same time.

Nickel, Cobalt from Cuba

Capital outlays in '58 will drop 13 per cent from 1957's $37 billion . . . Freeport Sulphur Co.'s Cuban American Nickel Co. is starting on a $119 million nickel-cobalt project to be completed by the summer of 1959. The operation will produce 50 million lb of nickel and 4.4 million lb of cobalt annually from ores mined and concentrated at Moa Bay, Cuba, and refined in Louisiana.

Straws in the Wind

Steel, copper, aluminum, and nickel alloy producers must use their customers' program identifications on defense-rated orders for primary nickel . . . Pittsburgh Metallurgical Co. wants to convert the government's chrome ore stockpile at Calvert City, Ky., into 40,000 tons of ferrochrome because the ore is being wasted away by the wind and rain . . . Pittsburgh Consolidation Coal Co. expects to be in commercial operation within 90 days on its coal pipeline running from Cadiz, Ohio, to the Eastlake power station of Cleveland Electric Illuminating Co.; the line has been partially operated since last April . . . American Die Casting Institute protested before a House Small Business Committee unit that preferential prices for molten aluminum in contracts between Reynolds Metals Co. and Ford and GM were destroying the ability of custom diecasters to compete.



J & L finds a thrifty way to equip a mill with new downcoilers

Not long ago, the 96" hot strip mill at Jones & Laughlin's Pittsburgh Works began to show need for coiler improvements. Bliss Rolling Mill engineers were called in to see what could be done.

After analyzing the situation, they determined that parts of the existing coilers could be retained for use with the Bliss Downcoiler principle. Bliss then performed the task of special design and "field tailoring" to insure improved functional operation.

Today, J & L has the equivalent of a pair of brand new downcoilers, complete with new housings, blocker rolls, stripper mechanisms, roller tables, guides and pinch roll units. The new coilers can handle 30,000-pound coils up to 94" wide.

This particular installation is typical of the Bliss Rolling Mill Division's versatility and open-minded approach to a customer's problem. It's easy to learn more about what they have done and can do... just write us today for a free copy of our 84-page Rolling Mill Brochure, Bulletin 40-B.

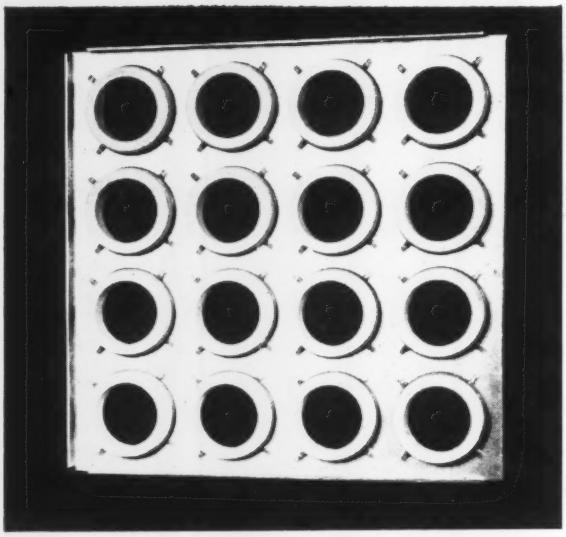
BLISS
SINCE 1857 ®

100 years of making metal work for mankind

E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio

How Armco ALUMINIZED STEEL Helps Electrical Resistors Fight Heat

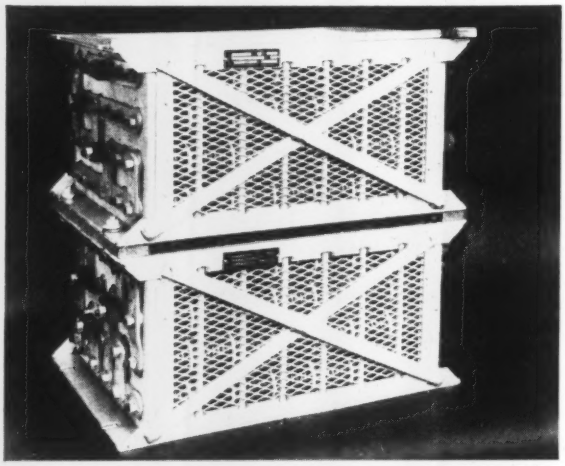


These high-temperature electrical resistors get **hot**. So every resistor part must resist heat. That's why Armco ALUMINIZED STEEL replaced aluminum-painted carbon steel for coil supports.

A leading manufacturer of electrical resistors for mine locomotives and mill cranes formerly made coil supports from carbon steel protected with aluminum paint. At high temperatures the paint flaked off, causing resistors to fail.

But such premature failures ended when the manufacturer switched to Armco ALUMINIZED STEEL for coil supports. The reason is the *hot-dip coating of aluminum* on ALUMINIZED STEEL. It alloys with the steel base... forms a refractory layer that doesn't flake off at temperatures up to 1250 F.

If heat, or a combination of heat and corrosion, cuts service life of your products, Armco ALUMINIZED STEEL Type 1 offers you this same positive protection. Just fill in and mail the coupon or contact your nearest Armco Sales Office for full information.



Other Armco Steels for top-quality products include ALUMINIZED STEEL Type 2, Stainless Steels, ZINCGRIP®, ZINCGRIP PAINTGRIP®, Cold-Rolled PAINTGRIP, Enameling Iron, Electrical Steels, Steel Tubing, Long Ternes, and high-quality Hot- and Cold-Rolled Sheets.

ARMCO STEEL CORPORATION
1508 Curtis Street, Middletown, Ohio

PLEASE SEND complete information about Armco ALUMINIZED STEEL Type 1. We make_____

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FIRM_____

STREET_____

CITY_____ ZONE____ STATE_____

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SHEFFIELD DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

Let the Public Know

American productive and financial genius has created the greatest industrial empire and the highest standard of living the world has ever seen.

Our research people can develop new materials to order.

Our engineers can design intricate machines to transform these materials into finished products for uses limited only by imagination.

Our marketing men can tell us what can be sold and where to sell it.

But despite all our technical and marketing skill, we are still strikingly weak in one all-important area: Public understanding of the role of business and industry in the economy.

People tend to identify themselves with three general groups: Managers and owners, workers, and consumers.

They think their interests are conflicting and unalterable—an impression that is fostered by a benevolent government, powerful union propaganda, and the failure of managers and owners to take enough time to tell their story.

We are pleased to note that some people are trying to clear up the situation.

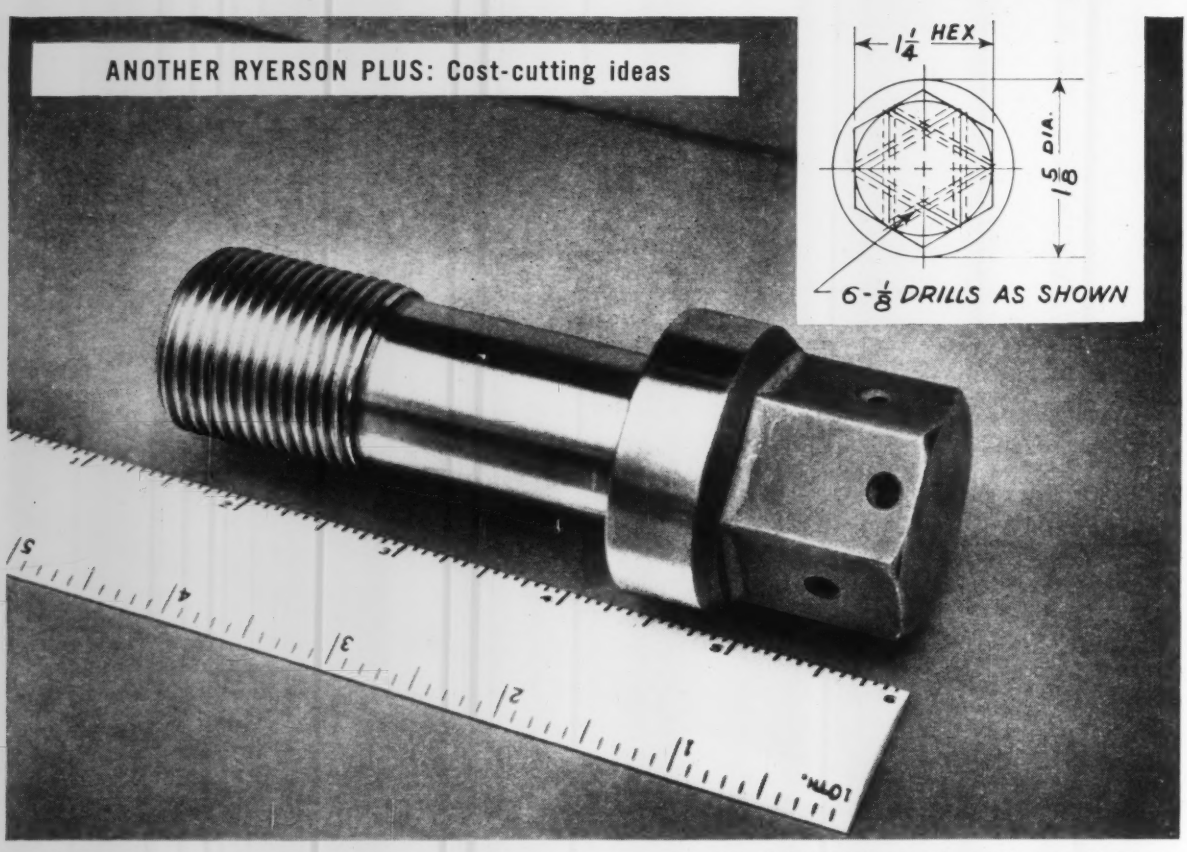
A case in point is the way the American Iron & Steel Institute is telling its story to the public.

The usefulness of steel, its low cost, what the industry does with its profits, and similar facts are told in advertisements with cartoon treatment and a light touch. (We like the one entitled, "Steel Does the Can-Can.")

We applaud the institute's efforts as a commendable step in the right direction.

But the job can't be fully accomplished unless every company in industry takes up the cause at every opportunity and considers itself an ambassador of public understanding.

Irwin H. Such
EDITOR-IN CHIEF



Rycut 40 drills cleanly, cuts down on tool wear and breakage.

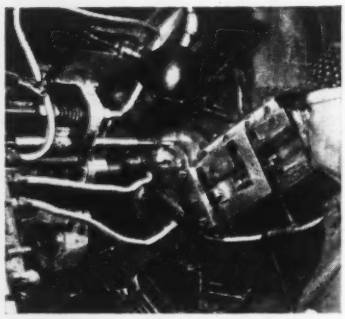
Rycut 40 alloy steel boosts production 30%, tool life 50%

Drilling piston pin bolt heads of AISI 4140 was a costly problem at Hyland Machine Co., Dayton, Ohio.

The job called for cross-drilling two holes in each face of the hex head (see diagram). A Ryerson specialist recommended new Rycut 40, the world's fastest machining alloy steel in its carbon range.

Here are the results, from Partner Forest Hyland: "We have cut down drill breakage. We have 15% fewer rejections. There is a marked improvement in finish, plus a comparable saving shown in milling the head of the bolt. Tool life on the automatic screw machines is 50% longer, total production is up 30%. Now we can produce this bolt at a competitive price."

There is a dependable, cost-cutting steel at Ryerson to meet every requirement. The Ryerson quality controls assure you of getting steel you can count on for dependable performance—every time. Ask your Ryerson specialist for help on your steel problems.



Six-spindle automatic screw machine producing piston pin bolts with cost cutting Rycut 40.

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When GM-UAW negotiations begin next week, here's . . .

What UAW Will Demand

- Huge wage increase
- Profit sharing plan
- Funded-type severance pay plan
- SUB for 52 weeks at 80 per cent of wage
- Job transfer rights with moving costs paid
- Bigger pensions with liberalized requirements
- Higher annual productivity increases

What UAW Hopes To Get

- Moderate across-the-board wage hike
- Extra 5c per hour pay boost for skilled workers
- Severance pay based on length of service
- SUB on modified daily basis
- Right of worker to follow job in plant move
- Language changes in work standard clauses
- More job protection for high seniority workers

Reuther's Package: Less Than a Dime?

AS negotiations between the United Auto Workers and General Motors Corp. draw nearer (they open next Tuesday, Mar. 25), poor economic prospects are causing strike odds to invert: STEEL now bets 4 to 3 there won't be one.

Walter Reuther may also settle for a 20-cent package (10 cents an hour each year for two years, including fringes). Points that could cause the most trouble are noneconomic — job transfer rights, company-wide seniority, work standards, special retirement provisions, and language changes in contracts.

Why Odds Change—Labor seers give these reasons for believing there'll be no work stoppage:

1. Although any strike is costly, carmakers are in a better position to weather one now than they have been in recent years. Finished car inventories stand at 60 to 90 days, and neither the auto companies nor the UAW looks for a sharp upturn in car sales to develop soon.

2. Top level people in the UAW are moving away from a strike declaration. With today's unfavorable economic prospects, they realize it would be impossible to get a big enough settlement to make up for the time lost.

3. Rank-and-file UAWites, many of whom are laid off, would probably not be too willing to support a strike since it would mean giving up their SUBenefits and unemployment compensation. The other side of that coin: Layoffs cause worry, fear, and irritation. Such a state of mind breeds hostility, making some workers anxious to strike.

Third Dimension—Skilled craftsmen in the UAW loudly demand a big boost in takehome pay. They've been pledged strike support if the demands aren't met. But an outside group, the Society of Skilled Trades, is complicating the issue by bidding to become the craftsmen's representative. It has petitioned the National Labor Relations Board for elections in several shops, notably around Flint, Mich.

Auto companies will not be willing to grant skilled men a big pay boost as part of the UAW package if there's a good chance that the SST will win representation elections because they would then have to go back to the bargaining table.

Mr. Reuther will be fighting the SST: He doesn't want to lose several thousand dues payers. He'll probably demand a minimum pay boost of 5 cents an hour for his craftsmen, in addition to across-the-board increases.

New Front — Because of widespread layoffs, the UAW strike fund hasn't built up as fast as expected. Among those who still look for a strike, many now believe Ford, not GM, will be the union's target. (Ford parleys start on Mar. 31.) A strike at GM would drain the fund at the rate of $8 million weekly; one at Ford would cost only half as much. And it would keep more people employed—important to the union during a recession.

Thorns—Robert H. Moore, deputy

director, Federal Mediation & Conciliation Service, lists six top problem sources in current and upcoming labor negotiations: Union security, management prerogatives, plant relocation, contact length, pensions, and skilled worker demands.

All six are sure to come up during the auto negotiations. Plant relocation is expected to figure in the settlement. The UAW is demanding job transfer rights, severance pay for workers who don't follow the move, and moving expenses for those who do. Auto firms are expected to grant job transfer rights and give some consideration to severance pay.

Shutdowns will be a big issue at Ford where recent plant closings have stimulated such demands. At Chrysler, work standard clauses may get their language changed. Plant-wide seniority will be a big issue at all plants: When bumping is held within departments, big layoffs result in inequalities seniority-wise. But management won't be too willing to grant the demand: Plant-wide bumping is costly since it results in men holding jobs for which they are not trained, and often, for which they don't have sufficient ability.

Old Record — SUBenefits will cause some dickering: The union wants them placed on "80 per cent of regular pay for 52 weeks." It also wants SUB on a daily basis to make up for short workweeks. There's some controversy as to whether that could be done without raising employer contributions. Possible result: SUB on a modified daily basis.

Much Noise — UAW publicity guns will continue to fire. Last week, they shot out this claim: Had the profit-sharing plan been in effect in 1957, each GM worker would have received a $591 bonus. Ford workers would have reaped $500; Chrysler employees, $323.

One big message was aimed at the public: UAW claimed that purchasers of GM cars and trucks would have an average rebate of $92; Ford buyers, $46; Chrysler buyers, $38.

A good bet is that the UAW's profit-sharing proposal will account for many words in newspapers and magazines in coming months, but it will not be written into any contracts.

Tool Potential High

Machine tool distributors told the bottom was hit last December, and a slow upturn is likely

MACHINE TOOL sales in 1958 can exceed 1957 level, despite a slow start.

That opinion was expressed by Frank Habicht of Marshall & Huschart Machinery Co., Chicago, president of the American Machine Tool Distributors Association, at the group's meeting in New Orleans.

"The greatest potential for new machine tool business this year," says Mr. Habicht, "is the dire need of all manufacturers to beat the price-cost-profit squeeze and obtain higher levels of output per man-hour."

Disagree—Other distributors and builders privately question Mr. Habicht's prediction for 1958 volume, but they agree on the need to beat the cost crisis. They believe the machine tool industry has reached bottom and that recognition of the need for greater efficiency in production will lead to a gradual upturn in sales.

Ludlow King, executive vice president, National Machine Tool Builders Association, voices the belief of builders that: "We sounded the most shallow water last December and are now slowly moving toward deeper channels.

"Potential buyers are demonstrating a more genuine interest in obtaining quotations.

"We hope that we can start putting back to work some of the 30,000 machine tool employees who were laid off . . . and to give a full week's work to those now employed but working only three or four days a week."

Missile Potential—A measure of what the missile program means to metalworking equipment manufacturers in terms of dollars was offered by Louis L. Gober, chief of the engineering branch, Army Ballistics Missile Agency, Huntsville, Ala.

To support production of the Redstone and Jupiter ballistics missile systems alone, says Mr. Gober, the government has provided $33 million for prime and major contractors' procurement of facilities. Some 20 per cent of that is going for machine tools. Plant facilities chew up another 32 per cent, and test equipment accounts for 48 per cent of the facility dollar.

What Missiles Need—Equipment for missilework in greatest demand so far: Lathes; jig borers; machines necessary for grinding, drilling, and milling; and sheet metal machines used in bending, forming, and shearing.

As the missile-programs advance, Mr. Gober predicts that the need for machines will increase, not only to satisfy normal obsolescence and wear replacement but also to fill the void being constantly created for tools-to-be—those which will do machining operations that are unknown today, on materials new to the metalworking industry, or those not yet developed.

Sees Upturn

Sylvania vice president says recession should end around the end of the second quarter

THE END OF THE SLUMP is foreseen "toward the end of the second quarter," by B. K. Wickstrum, senior vice president, marketing, Sylvania Electric Products Inc.

He expects a gross national product equal to a $436 billion annual rate in the second quarter, vs. slightly over $430 billion in the first.

"I don't think we could talk ourselves into a severe recession even if we tried," he adds.

Sylvania's Outlook—Sylvania (about 23 per cent of its sales go to the military) expects all sales to approach $400 million this year, compared with $343 million in 1957. The firm will need 100,000 sq ft of additional manufacturing space in the Waltham, Mass., area this year (and more later) to handle its share of an early warning device contract awarded by the Pentagon.

The $75 million contract is part of Sylvania's rapidly mounting defense backlog, Mr. Wickstrum notes. The firm will not hike prices in 1958, but it will have to absorb increased expenses, particularly higher labor costs. Its TV picture

tube business is running 11 per cent better than it did in last year's first two months.

Electronic Outlook—The industry will produce 15 million picture tubes in 1958, an increase of 2 million over 1957 sales. Mr. Wickstrum expects 6.8 million TV sets to be sold (factory sales), but he adds that the figure might hit 7 million if the economy picks up sooner.

Electronic industry sales will go to more than $14 billion in 1958, compared with $13.2 billion last year. Sales will hit $24 million by 1966, Mr. Wickstrum estimates.

$100,000 for FEF

Foundry Educational Foundation gets grant from Wheelabrator at college-industry conference

ANNOUNCEMENT OF a $100,000 educational grant from Wheelabrator Corp., Mishawaka, Ind., highlighted the Foundry Educational Foundation's college-industry conference Mar. 12-13 at Cleveland.

Wheelabrator makes airless blast cleaning equipment, steel abrasives, and dust collection equipment.

History—FEF was founded in 1947 by: American Foundrymen's Society, Foundry Equipment Manufacturers' Association, Gray Iron Founders' Society, Malleable Founders' Society, Non-Ferrous Founders' Society, and Steel Founders' Society of America.

Its objectives: Foster and improve education in foundry science and engineering; create an adequate pool of technical manpower for foundries; develop knowledge, awareness, and appreciation of cast metals potential among users; enlist technical abilities and facilities of the country's colleges in behalf of the cast metal industry.

Its projects: Provide scholarships and assistance to universities for engineering students at the undergraduate level; provide fellowships for graduate study; provide assistance to students in technical institutes; work in co-operation with founding member societies to provide information for designers, engineers, and students; and encourage company-sponsored programs of education.

Accomplishments — Since its inception, FEF has set up a scholarship fund made available annually to 17 colleges and universities. The value of foundry laboratory facilities at FEF-aided schools increased from $1,034,000 in 1947 to $2,496,250 last year.

The number of foundry professors at FEF schools soared from 19 in 1947 to 73 in 1957. Foundry courses increased from 17 to 105 during the ten-year period. Departments at FEF schools requiring cast metals study rose from 20 to 64.

The percentage of engineering students taking cast metal courses rose from 8.5 per cent in 1947 to 31 per cent in 1957.

Wean, GE Go to School

They try something novel in customer-supplier arrangements: GE is conducting a technical course on electrical problems for some of Wean Engineering's personnel

WEAN ENGINEERING Co. Inc., Warren, Ohio, and General Electric Co. have started something new in customer-supplier relations. A group of Wean's engineers are taking a course GE developed three years ago to help its young engineers do a better job on customers' problems.

Numerous inquiries involving electrical problems with mill equipment from Wean's assistant application engineers convinced GE that the class would be of practical use to both companies. Edward H. Wahl, sales engineer for GE, and David W. Plumer, an application engineer from GE's Apparatus Sales Div., Cleveland, deviewed the course and tailored it to Wean's interests.

Class—The first class at Wean was on Oct. 1, 1957. Twenty selected engineers attended one 2-hour session a week for 21 weeks. Practical application problems were assigned as homework. The final session was an automation seminar.

Mr. Plumer did the teaching. Wean's chief draftsman, chief design engineer, and chief construction engineer attended and salesmen often sat in.

Subject Matter — The material combines practical application problems and formal engineering theory. Originally prepared as a review text for engineers, the course is technical with a minimum commercial flavor.

Chief emphasis is on the selection and application of alternating and direct current motors and associated controls, including regulation principles. Other studies include the selection of drive motors for motor generator sets, power-factor correction, power distribution principles, brake applications, and other applications affecting over-all performance.

'58 Capital Outlays To Dip 13 Per Cent

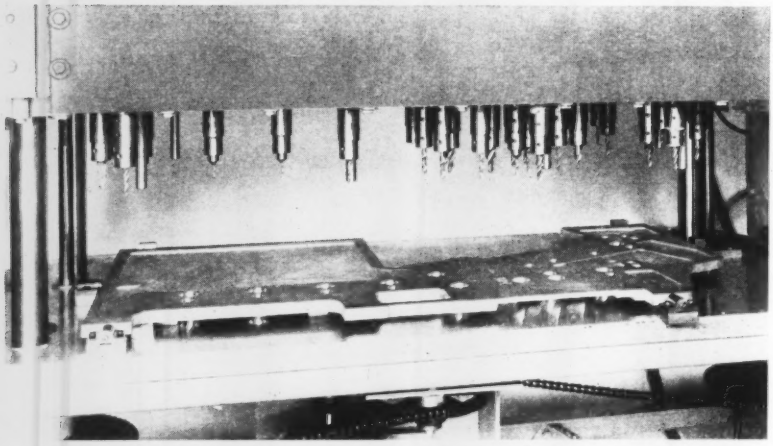
AMERICAN industry plans to spend $32 billion for new plant and equipment in 1958, 13 per cent less than the $37 billion spent last year, a study by the Commerce Department and Securities & Exchange Commission shows.

Capital spending has been dropping ever since 1957's third quarter. On an annual basis, it reached $37.8 billion then, slipped to $36.3 billion in the fourth quarter. It's expected to hit $34.0 billion this quarter and dip to $32.5 billion in the second three months. In this table (1958 estimates, vs. 1957 actual figures), note that only utilities are predicting an increase in outlays.

(In millions)	1958	1957	% Change
Manufacturing	$13,196	$15,959	−17
Durable	6,225	8,022	−22
Nondurable	6,971	7,937	−12
Mining	1,058	1,243	−15
Rail Transportation	868	1,396	−38
Other Transportation	1,440	1,771	−19
Communications, Commercial & Other	9,098	10,398	−13
Public Utilities	6,414	6,195	+ 4

COST CRISIS COMPETITION

This article is part of a campaign to help industry achieve lower unit production costs. The accompanying example and others to follow are samples of what the editors of STEEL are looking for in their nationwide search for companies that have brought about important cost savings through more efficient use of capital equipment. Does your company qualify? If so, enter the Cost Crisis Competition. Write to the Cost Crisis Editor, STEEL, Penton Bldg., Cleveland 13, Ohio, for your awards kit. An extra copy of this article is available until supply is exhausted. Write to Editorial Service, STEEL.



NEW METHOD **A purchasing agent suggested this change for Washington Machine & Tool Co., Minneapolis. Nine operations were combined in this one. Unit features a stationary jig and multiple drills attached to an articulating plate**

How Buyers Beat Cost Crisis

PURCHASING MEN can play a key role in beating the cost crisis (see checklist).

Ways—PAs see venders of equipment. It's their job to keep up with developments.

In seeking ways to hold down the cost of materials, they sometimes find that new equipment will pare processing expenses.

In the purchase of equipment, they can save by cutting frills and working out cost saving arrangements with the manufacturer.

Team — Most purchasing people believe the greatest progress can be made when production, engineering, and purchasing operate as a team.

Here are three instances in which purchasing initiated the use of new or modified equipment to lower unit production costs.

1. By Installing New Equipment

Carrier Corp., Syracuse, N. Y., had a problem: How to maintain adequate stocks of sheet sizes needed for the company's line of air conditioning, refrigeration, and heating equipment. (The four large tonnage gages used were ordered in 88 sizes.)

Steel Buyer Norbert Wiesnet was flooded with rush requisitions he couldn't fill from stock. The reason: In air conditioning, especially, it's almost impossible to keep large enough quantities of different sizes on hand because so many models are involved. As demand for models changed, production schedules had to be revised.

When the right sizes were not on hand, Mr. Wiesnet had to place a rush order for higher priced warehouse steel.

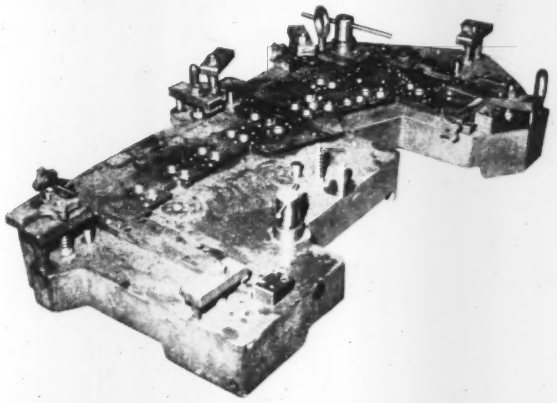
Suggestion—Adolph G. Ruediger, director of purchases, made a recommendation to factory engineering: Carrier should install a coil processing line to straighten, level, shear, and slit coiled steel. He reasoned that this would enable it to buy 16 coil widths, which could be cut to length for requirements.

Coil processing equipment worth $120,000 was installed. It takes a 10,000-lb coil, 48 in. wide, and shears it into sheets 2 to 15 ft long. Maximum capacity is 12 gage. When coils must be split before shearing, a hump table can be removed and a recoiler mounted at this point to rewind the steel in coils.

Results—Carrier had two savings in mind: 1. Purchase of steel in coils instead of standard mill sizes. 2. Scrap reduction. Since the line was put into operation, the company has also realized savings from: 1. Less inventory. 2. Fewer steel procurement problems. 3. Easier changeovers for new models of air conditioners. 4. Better scrap prices.

Doors and front panels are turned out 600 per cent faster than they were. It formerly took an average of 1.2 minutes to produce one blank on a standard power squaring shear. The cut-to-length line is doing the same job in 0.2 minute.

Scrap from the cut-to-length line (including side trim and coil ends) averages about 2 per cent, vs. 10.4 per cent before. During the first 11



OLD METHOD The side frame was strapped to this jig and moved manually through a series of nine machines; each did a different operation

How PAs Have Helped

IN SELECTING EQUIPMENT: Worked with vender to develop better equipment. Suggested equipment to replace existing lines. Advised management of new type equipment. Brought vender and production-engineering together.

IN BUYING EQUIPMENT: Lowered design specifications without affecting quality. Substituted standard items for custom-built accessories. Shopped around for lowest possible figure.

HERE ARE SOME EXAMPLES:

. . . "We saved 17 per cent by downgrading an unnecessarily high specification for a joint on a welded vessel."

. . . "We cut costs by buying drives and motors for new equipment from another supplier (at wholesale prices) and having them installed by our engineering department."

. . . "When we purchased several new cranes, we worked out specifications with the manufacturer so our present supply of spare parts would be interchangeable with his units. This cut our inventory of spare parts and released money that would otherwise have been tied up."

months the line was in operation, scrap savings amounted to $92,100. In the same period, savings in buying steel in coils rather than mill size sheets came to $50,600.

2. By Working with Suppliers

Says Harry J. Moore, director of purchasing, International Business Machines Corp.: "As part of their responsibilities, IBM purchasing agents work with suppliers to initiate a cost reduction program through the use of new or modified equipment in the suppliers' plants. This, of course, lowers our unit production costs. Our people are also on the lookout for nonsuppliers who have equipment that can be modified to our needs."

Example—IBM's Rochester, Minn., plant makes data processing equipment. Each unit has two aluminum permanent mold castings as side frames. Both frames require the drilling of 174 holes—32 are to extremely close tolerances. (Their location has to be held to plus or minus 0.001 in. and diameters must be held to plus 0.0005 in. minus 0.0000 in.)

The traditional method was to use nine multispindle machines that had a series of special position drills. The side frame was strapped to a jig and moved from machine to machine (see old method photo). Time lost setting the drills and repositioning the side frame at each machine made the cost of the operation one of the plant's major expenditures.

While visiting the plant of Washington Machine & Tool Co., Minneapolis (a nonsupplier), Kenneth Zubay, then purchasing agent, saw a machine that might be converted for the side frame drilling. Product and manufacturing engineers from the IBM plant were called in and, along with purchasing, worked with Washington personnel to adapt this unit.

Savings — The group came up with a machine that cut capital equipment costs of the operation 75 per cent and reduced side frame production costs appreciably.

Here's how the new unit works: After the side frame is milled to specification, it is placed in a stationary jig (see new method photo). Multiple drills attached to an articulating plate move back and forth over the side frame, machining holes to specification. A production step that formerly took nine machines can now be done by one machine in a single operation.

3. By Simplifying Fabrication

The pressed steel division of Standard Pressed Steel Co., Jenkintown, Pa., fabricates such shop equipment as shelving, stools, and workbenches. Until recently, the company bought 48 in. wide steel sheets, then sheared them into strip 6 in. wide.

Purchasing Agent John P. Moorhouse and his department felt that handling cost too much. The department collected facts and went to management with an idea: Install a $350,000 Wean slitter with a flying press shear.

Advantages that sold management: 1. Substitution of coils for sheets. (Coils are $6 a ton cheaper than sheets, which saves the company $7200 a month.) 2. Elimination of the shearing operation. 3. A 300 per cent speedup in operations.

This spinning machine hot rolls the hemispheres before they are joined

Missiles Use Titanium

Cold-resistant properties of the metal make it ideal for storing helium. Alloy pressure vessels aid control of propellent flow in the ICBM's combustion chambers

THE FIRST LARGE-SCALE use of titanium in the U. S. intercontinental ballistic missile program has been announced by the builders of the Atlas.

The alloy, containing 6 per cent aluminum and 4 per cent vanadium, is produced by Titanium Metals Corp. of America. It is used in helium storage bottles which help control propellent flow into combustion chambers.

Properties—The decision to use titanium was based on four factors: Weight savings, low temperature properties, strength, and corrosion resistance.

L. W. Standley, senior engineer in charge of mechanical design, Convair (Astronautic) Div., General Dynamics Corp., San Diego, Calif., spelled them out this way:

Weight is perhaps the most critical area of missile design. It is estimated that each pound of weight saved adds 1 mile to the range. A titanium bottle weighs 50 lb, vs. aluminum, 80 lb; and steel, 125 lb. One fabricator says titanium bottles could add 700 miles to the range of IRBM. (The Atlas uses more than one bottle, but the number is classified.)

Low temperature properties of titanium have long been overshadowed by its ability to resist heat to 1000° F. Since helium is stored at −300° F, the metal's ability to retain properties at low temperatures is receiving more attention.

Bottles must withstand internal pressures of 5000 lb. Since they are basically two hemispheres welded together, they require extremely good welds. Because of its corrosion resistance, titanium requires no paint or surface finishing which might crack, chip, or peel.

Future—Several other fabricators are rushing designs and tests on vessels for the Atlas. "These people know Atlas won't be produced like automobiles," Mr. Standley says, "but the outlook for titanium in missile applications is good, especially in such areas as bottles, hydraulic tubing, and skins."

GE Plans New Foundry

General Electric Co. will establish a $3.7 million steel casting foundry. It will be located in the present iron foundry building in the company's Schenectady, N. Y., plant.

Capacity for manufacturing larger iron castings will be retained. Re-equipping is scheduled to begin this summer and to be completed in 1960. The planned expansion will permit GE's Foundry Dept. to produce castings weighing as much as 85,000 lb. Present facilities put a 35,000 lb limit on castings.

Installed in the foundry will be an electric arc furnace capable of melting over 200,000 lb of steel or high grade iron. A 125-ton bridge crane will also be added to the plant along with two high temperature heat treating furnaces and a new waterroom.

The foundry will permit an increase in steel casting production of about 50 per cent over present levels, say foundry department engineers. The department produces about 1000 tons of castings per week in foundries at Everett and Lynn, Mass., Elmira and Schenectady, N. Y., and Erie, Pa.

Here Are Ballistic Missile Subcontractors

(Component makers, not R&D firms)

MOST OF the subcontracts for ballistic missiles (Jupiter, Polaris, Thor, Titan, and Atlas) are held by firms in the accompanying list, says the Air Force Association, Washington. (Some names may be omitted for security reasons.) The number of subcontractors in the nation's whole missile program (including guided types) would probably run into the thousands. This list does not cover second tier subcontractors or venders.

Prime contractors for the Atlas are: Convair Div., General Dynamics Corp., North American Aviation Inc., General Electric Co., Burroughs Corp., and American Machine & Foundry Co. The Titan: Martin Co., Aerojet-General Corp., American Bosch Arma Corp., Sperry Rand Corp., Western Electric Co. Inc., and Avco Mfg. Corp. The Thor: Douglas Aircraft Co. Inc., North American, General Motors Corp., and GE. The Jupiter: Chrysler Corp., North American, Sperry Rand, and Goodyear Aircraft Corp. The Polaris: Lockheed Aircraft Corp., GE, Aerojet, and Westinghouse Electric Corp.

New England

Electronics & Instrumentation Div., Baldwin-Lima-Hamilton Corp., Waltham, Mass.
Barden Corp., Danbury, Conn.
Barry Controls Inc., Watertown, Mass.
Cambridge Corp., Lowell, Mass.
Epsco Inc., Boston
New Departure Div., General Motors Corp., Bristol, Conn.
Nickel Cadmium Div., Gould-National Batteries, Easthampton, Mass.
Hicks Corp., Hyde Park, Mass.
National Co. Inc., Malden, Mass.
Instrument & Systems Div., Norden-Ketay Corp., Milford, Conn.
Perkin-Elmer Corp., Norwalk, Conn.
Clifford Mfg. Co. Div., Standard-Thomson Corp., Waltham, Mass.
Talco Engineering Co., Hamden, Conn.
Trans-Sonics Inc., Lexington, Mass.
Machinery Hydraulics Div., Vickers Inc., Waterbury, Conn.

New York

Advanced Products Div., ACF Industries Inc., New York
American Car & Foundry Div., ACF, New York
Air Reduction Co. Inc., New York
Airborne Instruments Laboratory Inc., Mineola
American Machine & Foundry Co., New York
Bell Aircraft Corp., Buffalo
Belock Instrument Corp., College Point
Scintilla Div., Bendix Aviation Corp., Sidney
Utica Div., Bendix, Utica
Consolidated Avionics Corp., Westbury
Apparatus & Optical Div., Eastman Kodak Co., North Rochester
Federal Mfg. & Engineering Corp., Garden City
Becco Chemical Div., Food Machinery & Chemical Corp., Buffalo
General Bronze Corp., Garden City
Stromberg-Carlson Div., General Dynamics Corp., Rochester
Oneida Products Div., Henney Motor Co., Canastota
Hitemp Wires Inc., Westbury
W. L. Maxson Corp., New York
Norden Laboratories Div., Norden-Ketay, White Plains
Potter Instrument Co., Plainview
Reeves Instrument Corp., Garden City
Riverside Plastics Corp., Hicksville
Mechatrol Div., Servomechanisms Inc., Westbury
Sonotone Corp., Elmsford
Sterling Precision Corp., New York
Wheeler Laboratories Inc., Great Neck

New Jersey & Pennsylvania

Avion Div., ACF, Paramus, N. J.
Applied Science Corp. of Princeton, Princeton, N. J.
Eddystone Div., B-L-H, Eddystone, Pa.
Standard Steel Works, B-L-H, Burnham, Pa.
Eclipse-Pioneer Div., Bendix, Teterboro, N. J.
Red Bank Div., Bendix, Eatontown, N. J.
York Div., Bendix, York, Pa.
York Corp., Borg-Warner Corp., York, Pa.
Allen B. DuMont Laboratories Inc., Clifton, N. J.
Warren Components Div., El-Tronics Inc., Warren, Pa.
Government Electronics Div., Emerson Radio & Phonograph Corp., Jersey City, N. J.
Hunter-Bristol Corp., Bristol, Pa.
Kearfott Co. Inc., Little Falls, N. J.
Defense Electronic Products Div., Radio Corp. of America, Camden, N. J.
Reaction Motors Inc., Denville, N. J.
Snap-Tite Inc., Union City, Pa.
Tele-Dynamics Inc., Philadelphia

South Atlantic

Nuclear Products—Erco Div., ACF, Riverdale, Md.
Aircraft Armaments Inc., Cockeysville, Md.
Atlantic Research Corp., Alexandria, Va.
Explosives Div., Atlas Powder Co., Wilmington, Del.
Friez Instrument Div., Bendix, Towson, Md.
Electro-Mechanical Research Inc., Sarasota, Fla.
Florida Div., Food Machinery, Lakeland, Fla.
Hoover Electronics Co., Timonium, Md.
Litton Industries of Maryland Inc., College Park, Md.
Melpar Inc., division of Westinghouse Air Brake Co., Falls Church, Va.
Milgo Electronic Corp., Miami, Fla.
Miller Metal Products Inc., Baltimore
Soroban Engineering Inc., Melbourne, Fla.

East North Central

Aeronca Mfg. Corp., Middletown, Ohio
Chicago Div., American Bosch Arma Corp., Oak Lawn, Ill.
Crosley Div., Avco, Cincinnati
Hamilton Div., B-L-H, Hamilton, Ohio
Baldwin Piano Co., Cincinnati
Cincinnati Div., Bendix, Cincinnati
Skinner Div., Bendix, Royal Oak, Mich.
Brooks & Perkins Inc., Detroit
Brush Beryllium Co., Cleveland
Cadillac Gage Co., Detroit
Champion Co., Springfield, Ohio
Cook Electric Co., Chicago
Cummins Engine Co. Inc., Columbus, Ind.
Fruehauf Trailer Co., Detroit
Goodyear Aircraft Corp., Akron
Griscom-Russell Co., Massillon, Ohio
Gruen Precision Laboratories, Gruen Industries Inc., Cincinnati
North Electric Co., Galion, Ohio
Pyle-National Co., Chicago
Salon Foundry Inc., Salon, Ohio
Sun Electric Corp., Chicago
Thompson Products Inc., Cleveland
Head Hydraulics Div., Vickers, Detroit

West North Central

Control Data Corp., Minneapolis
Couples Div., Eagle-Picher Co., Joplin, Mo.
Minneapolis-Honeywell Regulator Co., Minneapolis

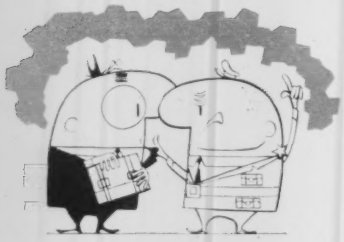
South Central & Mountain

Chemical Milling Div., California Aircraft Products, Grand Prairie, Tex.
Machine Engineering Co. Inc., Tulsa, Okla.
Space Corp., Garland, Tex.
Stewart & Stevenson Services Inc., Houston
Varo Mfg. Co., Garland, Tex.
Denver Div., Wallace Process Piping Co. Inc., Denver

California

Advance Gear & Machine Corp., Los Angeles
Ampex Corp., Redwood City
West Coast Div., Amphenol Electronics Corp., Los Angeles
Fred F. Antelline, San Diego
Automation Instruments Inc., Pasadena
Babcock Radio Engineering Inc., Costa Mesa
Basic Tool Industries Inc., Gardena
Computer Div., Bendix, Los Angeles
Pacific Div., Bendix, North Hollywood
Bone Engineering Corp., Glendale
BJ Electronics, Borg-Warner, Santa Ana
Calcor Corp., Los Angeles
Chalco Engineering Corp., Gardena
Christie Machine Works, San Francisco
Clary Corp., San Gabriel
Cohu Electronics Inc., San Diego
Consolidated Electrodynamics, Pasadena
Davidson Mfg. Co., West Covina
Dynac Inc., Palo Alto
Electronic Engineering Co., Santa Ana
Elliott Engineering Co. Inc., Lynwood
Ordnance Div., Food Machinery, San Jose
Los Angeles Div., George A. Fuller Co., Los Angeles
Futurecraft Corp., El Monte
G. W. Galloway Co., Arcadia
Adel Precision Products Div., General Metals Corp., Burbank
Librascope Inc., General Precision Equipment Corp., Glendale
B. H. Hadley Inc., Pomona
Paul Hardeman Inc., Los Angeles
Herlo Engineering Corp., Hawthorne
Hoefner Corp., El Monte
Houston Fearless Corp., Los Angeles
Hufford Corp., El Segundo
Inter-Continent Engineering Co., San Francisco
Interstate Engineering Corp., Anaheim
Kaiser Industries Corp., Oakland
Pacific Div., Ladish Co., Los Angeles
Leach Corp., Los Angeles
Electron Tube Div., Litton, San Carlos
Modern Die & Tool Corp., Los Angeles
Narmco Mfg. Co., Las Mesa
Oakland Machine Works, Oakland
Pacific Automation Products Inc., Glendale
Packard-Bell Electronics Corp., Los Angeles
J. C. Peacock Inc., Los Angeles
Pacific Alloy Engineering Corp., Pelton Steel Casting Co., El Cajon
Precision Sheet Metal Inc., Los Angeles
Radiaphone Co. Inc., Monrovia
Reliant Industries, South Gate
Research Welding & Engineering Co. Inc., Compton
Aircraft Div., Rheem Mfg. Co., Downey
Sancor Corp., El Segundo
Servo Mechanisms Inc., Hawthorne
Hallamore Electronic Co., Siegler Corp., Anaheim
Solar Aircraft Co., San Diego
Titanium Fabricators Inc., Burbank
Transco Products Inc., Los Angeles
Waldrip Engineering Co., Hollydale
Waste King Corp., Los Angeles
Western Gear Corp., Lynwood

Source: Air Force Association.



How Do You Keep Defense Business?

FRANK L. DAVIS, president, Davis Aircraft Products Inc., New York, has a problem. He initiated a new product with the Pentagon, yet has not been able to get all contracts let for it by the Defense Department.

It's not an uncommon problem. Both big and little firms face it because our laws allow the department to get multiple bidding on defense business by releasing patented specifications to competitors. In one way, it's the fairest way to make sure defense business is not concentrated in the hands of a few. But the practice also penalizes firms that have the engineering talent to come up with ideas.

Davis Aircraft makes tiedowns and fasteners for cargo and missiles. Even though Davis developed the idea, other companies, willing to take a loss on their first contracts, have underbid. Although its engineering staff brings up a cheaper product, other firms can undercut the price at times because they are in a cheaper labor area.

Small Businessman's Dilemma

In rebuttal, one might say the government's policy helps small firms stay in the defense field. But Davis Aircraft is small business. With fewer than 200 employees, it will gross about $2 million in 1958. A larger company (and this could be the crux of the situation) wouldn't offer an idea to Defense in the first place for fear someone else might walk off with the initial contract, guesses Mr. Davis. But his profits are in ideas, he says. He has to offer them to the only market available, the Pentagon.

The case history: Davis Aircraft developed a tiedown half the weight and twice the strength of other available items, says Mr. Davis, but missed the first contract for 40,000 tiedowns by a matter of pennies to its most immediate competitor. Mr. Davis reports his engineers even did the initial testing of the tiedowns free. The firm has been able to pick up most of the later contracts—but always in tough competition with firms that don't do the same development work, Mr. Davis points out.

More Defense Work Soon

To combat the recession, President Eisenhower says a new clause is going into contracts for primes "urging" them to give small firms preference in labor surplus areas. Wilfred McNeil, Pentagon comptroller, adds that he expects defense outlays to go up $1 billion annually the next five years (present level: $39 billion). Space weapons spending in the same period will jump from $250 million in fiscal 1959 to over $1 billion yearly.

The high concentration of research and development dollars in that figure, however, continues to thwart small firms' chances for a bigger slice of the defense business (unless they, like Davis Aircraft, are willing to risk using expensive engineering talent).

Defense reports small firms' share of military procurement dipped to 15.1 per cent in the last half of 1957. Contracts let for aircraft, missiles, research and development grabbed 69 per cent of all procurement in the period, vs. 54 per cent in the period from July, 1956, through June, 1957.

The Panic of '58

Labor Secretary James Mitchell scooped his own department last week by prematurely releasing unemployment figures (5.2 million in February) to delegates attending an AFL-CIO "emergency and legislative" conference in Washington, convened for the obvious purpose of getting quick Congressional action on public works and taxes.

His move was tipped off, to some extent, by Vice President Richard Nixon's endorsement of tax cuts the day before. That left both parties recommending increased works spending, emergency housing measures, more defense orders, a cut in excise taxes, and tax cuts for individuals.

Behind this "have your cake and eat it too" attitude, no one seemed to hear Sen. Edward Martin (R., Pa.) quietly remind the Senate Public Works Committee that any speedup program will mean either a greater than planned deficit in fiscal 1959 or a need for new taxes.

A few Capitol Hill observers are guessing most Democrats will retreat from their tax cut proposals to concentrate on public works spending, following Mr. Nixon's belated entry into the field of advocates of the tax route to a better economy. Tax cuts under a Democratic Congress, but a Republican administration, tend to be remembered as administration-sponsored, these observers suggest.

The Democrats, on the other hand, have a tradition of advocating higher public works spending, so they feel surer of themselves in that area. They are also counting on a Republican move to couple individual tax cuts with corporate cuts to continue the illusion of the Republican endorsement of "big business."

Capitol Notes

Atomic Energy Commission will survey the market for fission products . . . The Air Force will test fire before July the largest solid propellent rocket motor ever made.

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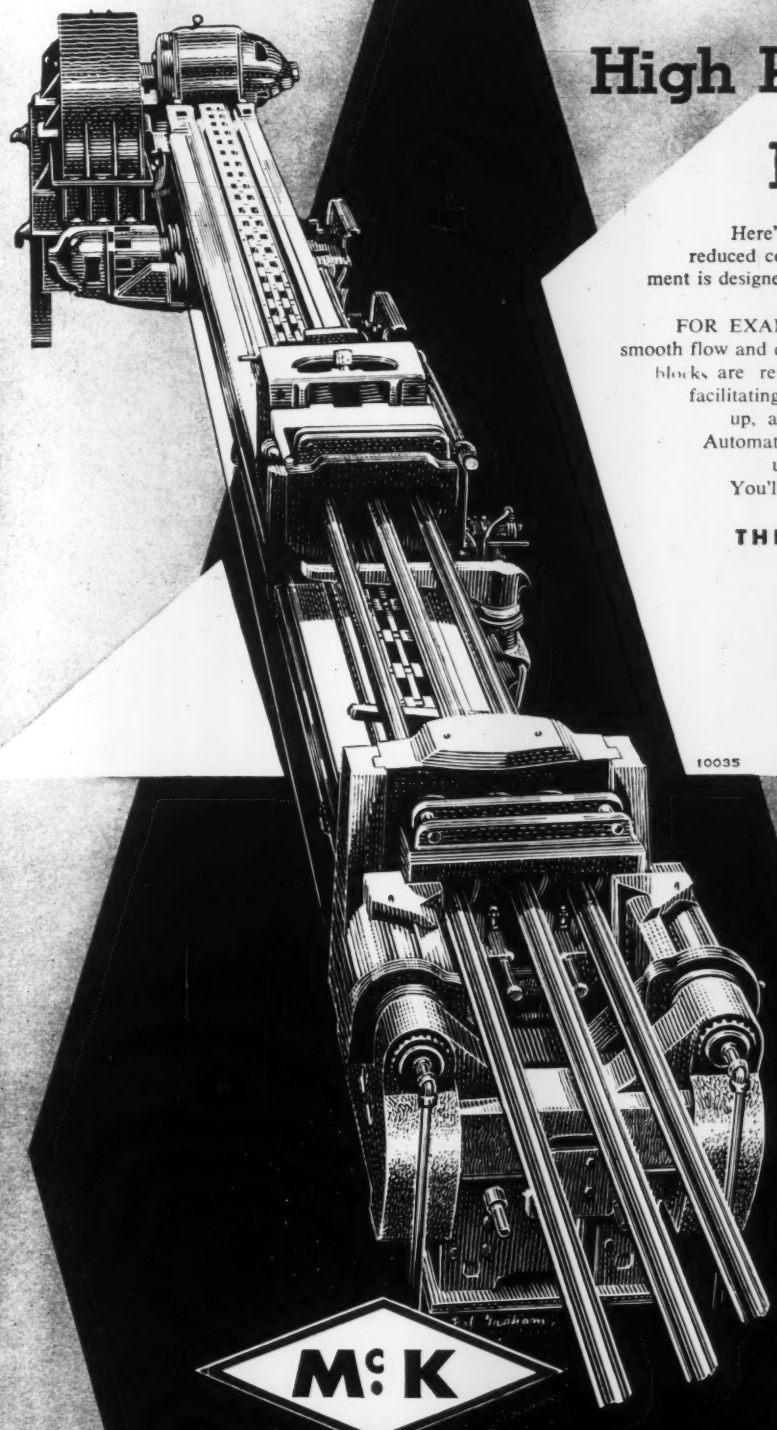
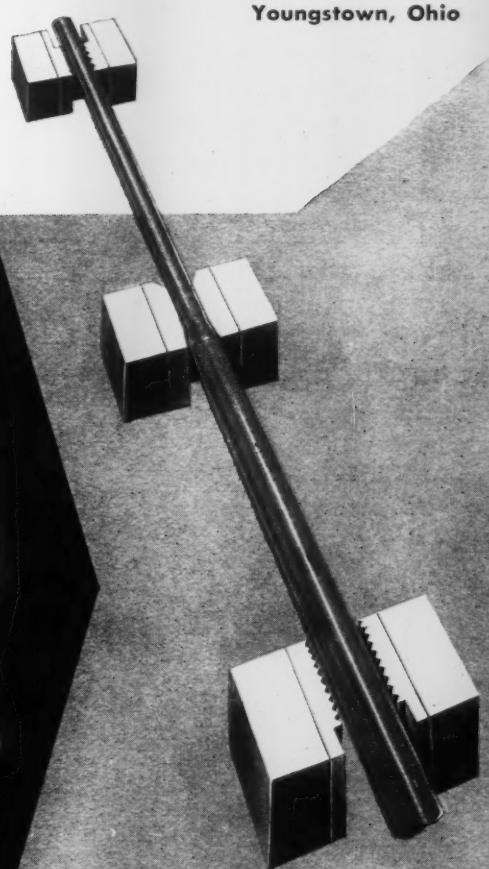
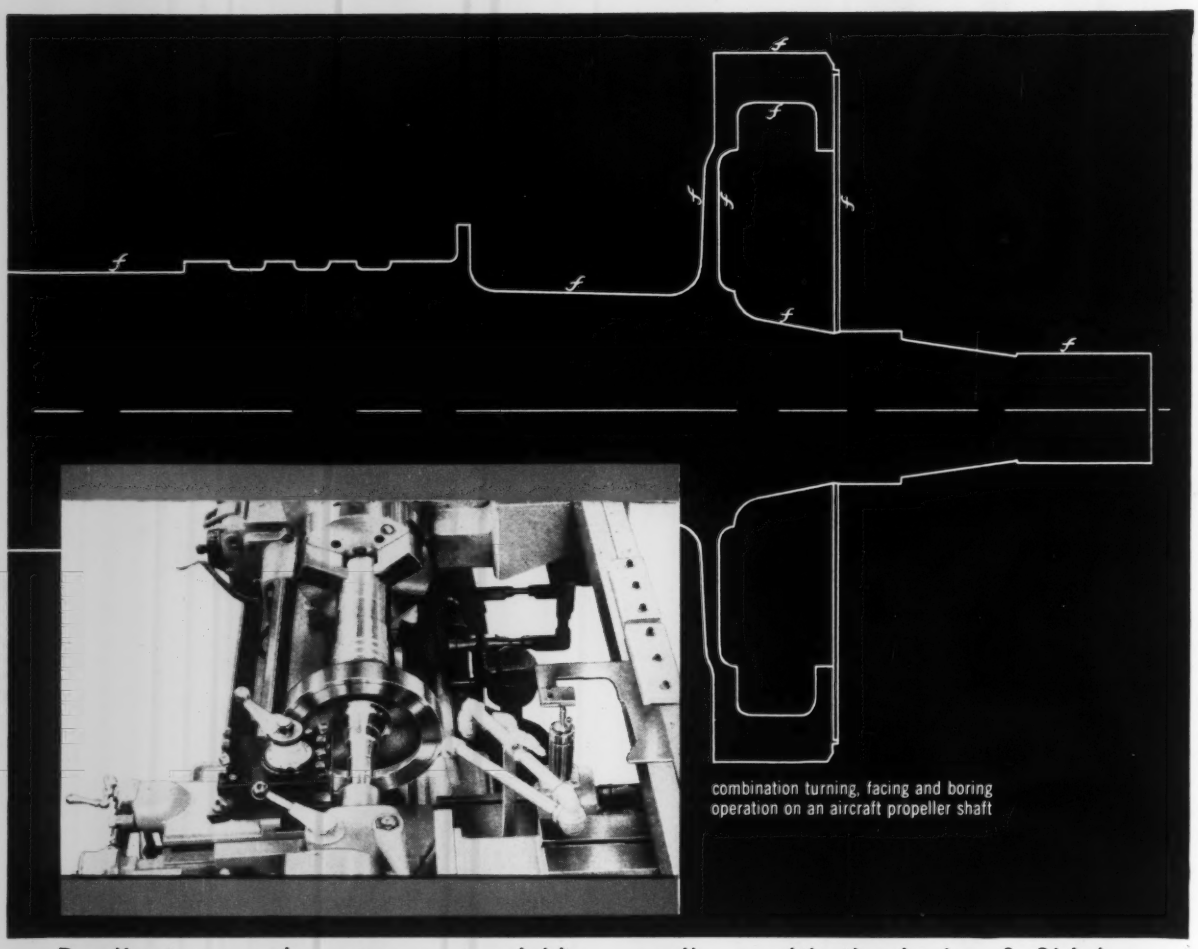




McK

SETTING THE STANDARDS OF QUALITY METAL WORKING MACHINES FOR TWO GENERATIONS



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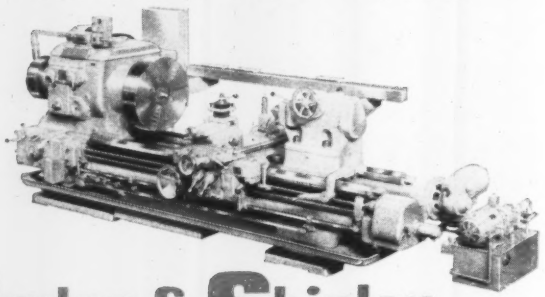

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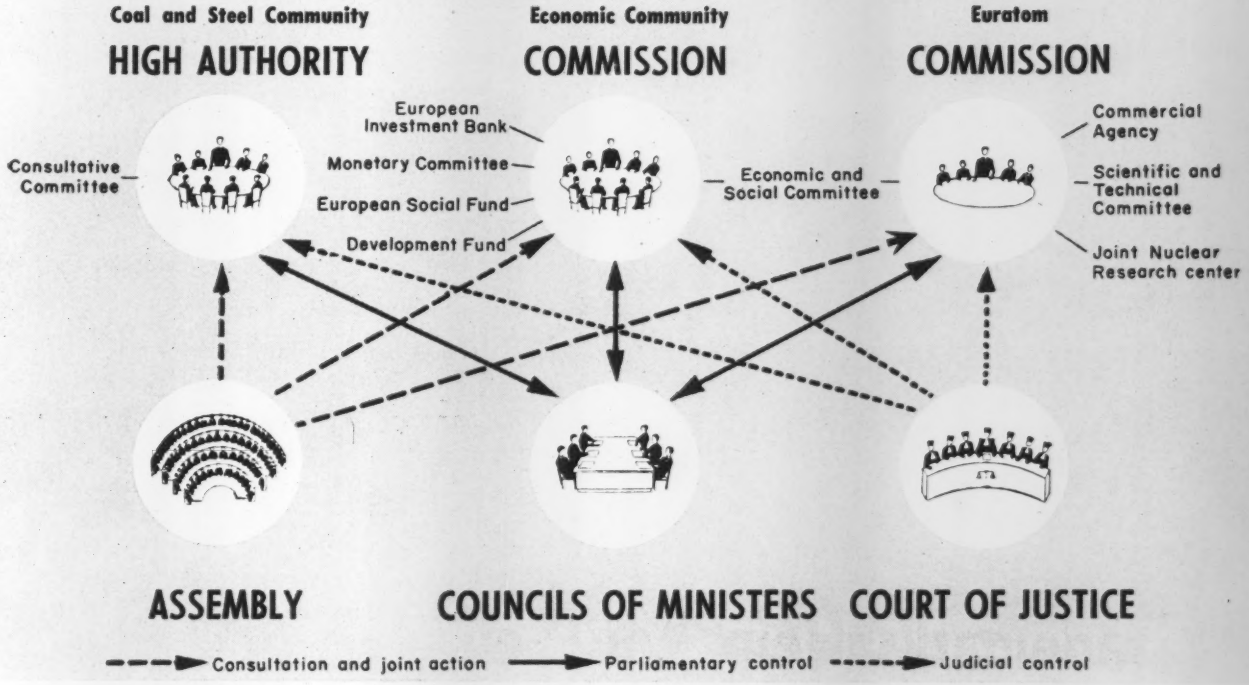
How These European Communities Work



Europe Still Booms

Start of the common market is one explanation. Steel is doing particularly well, and exports, notably those to this country, are holding up. Car sales are big help

THE EUROPEAN Coal & Steel Community will produce at least 73 million net tons of steel ingots by 1960, perhaps as much as 81 million tons.

That's the forecast of community economists, optimistic about the potentials of the common market that officially began Jan. 1 for West Germany, the Netherlands, Belgium, Luxembourg, France, and Italy.

Anticipation—Looking forward to sales possibilities and lower tariffs, businessmen from the six nations are building plants in other countries of the community, arranging revised sales setups, and generally exuding confidence which has even gone beyond the borders of Euro-market into Scandinavia, Britain, and Switzerland.

Another reason for the confidence: The potentials of Euratom, the six nations' joint effort to develop atomic power which also started officially on Jan. 1.

Steel, the Symbol—Europeans are pointing to steel expansion by the community in the last five years as a hint of what the additional joint efforts can mean for the future. The steel market has been functioning since February, 1953. Its steel output reached some 65 million net tons in 1957, 43 per cent more than its 1952 effort. World output in the same period expanded 38 per cent.

For the first time since before World War I, Europe was not being outpaced by the rest of the world. Among the globe's four major steel producers (U. S., the community, Russia, and Britain—in that order), only the Soviet Union showed a greater expansion rate (48 per cent). The U. S. expanded 21 per cent in output, Britain 32 per cent.

No Recession—Nor does it look like European steel producers will suffer anything like the slump that's afflicting American companies. Although pig iron production in France is down from that of the last quarter of 1957, order books at the end of December were 100,000 tons over those of the previous year. Steel deliveries for that month were 6 per cent above those in the same month of 1956.

Europeans are not even suffering a decline in their exports to the U. S. America's imports for 1957 rose 3 per cent over 1956's, to hit $13 billion. Last December's total was 9 per cent above the November figure and 8 per cent above that of December, 1956. Imports of European cars contributed substantially to the rise.

You Can't Register a Mark That . . .

1. **Is the insignia of a nation, state, or municipality.**
2. **Is immoral, deceptive, or scandalous.**
3. **Falsely suggests connection with persons, institutions, or beliefs. ("Copacabana" was rejected for perfume because it suggested connection with the nightclub.)**
4. **Is the name, portrait, or signature of a living individual unless he (or she) consents.**
5. **Is the name, portrait, or signature of a deceased U. S. President while his widow is alive.**
6. **Does no more than describe the product. ("Dual-drive" was not permitted as the trademark for a lathe because any maker of a lathe with two drives has a right to freely call his product "dual-driven.")**
7. **Is a surname, descriptive word, or geographical location unless it has been used long enough that it identifies and distinguishes one maker's goods. (O.K. are: "Du Pont," "Nu-Enamel," "Elgin.")**
8. **Is color alone. (But color can be registered when combined with other factors.)**

Source: U. S. Patent Office

Trademarks Help You Sell

IN ANCIENT Egypt, slaves put their mark or scratch on each building block they made. The first trademarks, their purpose was to fix responsibility for a product by designating its source. The more than 400,000 registered trademarks in the U. S. today serve the same primary purpose.

Many other benefits redound to the manufacturer who exploits trademarks wisely and fully. They are especially helpful in marketing new products and introducing old products into new areas. They're a convenient handle for your advertising, an excellent good will ambassador, and an effective selling aid for local distributors.

History—As Egypt developed into a powerful manufacturing and trading nation, artisans and craftsmen adopted unique symbols which they put on their goods. So marks got their second job: If a customer liked the item, he could buy another with the same mark and be assured of equal quality. "Brand recognition" was born.

A third job (protection of the public) had its origin in ancient Rome. A purchaser of fraudulently marked goods was accorded the right to seek redress in the courts.

The next important step was the development of a fairly comprehensive code of trademark law by the Holy Roman Empire. One section extended protection to the owner of a mark: "No one must take another's mark, even if he artificially disguises it by some addition, but keeps the principal part unchanged."

How To Apply—Today, you can get even greater protection by registering your trademark with the Patent Office. Here's how:

1. When you've decided upon a word, letter, symbol, slogan, or combination, hire a patent attorney to search current registrations to see if a like mark is already in use.

2. If the mark is not in use, affix it to your product, sell the product, and ship it in interstate commerce.

3. Then file an application (a simple, one-page form) with the Patent Office. It will search its records to find out if a similar mark is in use. Basic test of similarity: Are the two marks (and products) sufficiently alike to mislead or confuse the public? For example, it would probably be possible to use Camel as the trademark for penknives but not for cigaret lighters.

4. If registerable (list shows what can't be), your trademark will be published in the *Official Gazette*, a Patent Office publication.

5. Other patent owners have 30 days to oppose your registration. They can request a longer period (normally no more than 60 days) by showing cause. If there is no opposition, your registration is issued.

How To Renew — Between the fifth and sixth year after your mark is registered, you must file an affidavit of continued use (if you're still using the mark). If you're no longer using it, but you want to keep it, you will be required to show "excusable nonuse." That means you'll have to prove that it is currently impossible for you to use the mark. Examples: Liquor companies obtained such permission during prohibition. Some manufacturers got permission during World War II when they temporarily switched from commercial to defense products.

The Law — Trademark right is determined by priority of use. If someone else has been using a mark like yours (although he hasn't reg-

What Trademarks Cost . . .

(Patent Office charges)*

Filing to register a mark	$25
Filing to renew a mark:	
Before expiration	$25
During three-month grace period after expiration	$30
Filing Notice of Opposition	$25
Recording assignment (Example, when ownership of a mark changes through sale)	$3†
Each additional mark assigned by same document	50 cents
Transferring certificate from Act of 1905 to Act of 1946 (Long-time owners do this to get added benefits under new act)	$10
Filing affidavits of continued use	No fee
Filing with Bureau of Customs for coverage of all ports of entry	$25

*Does not include lawyers' fees.
†Unless it is longer than three pages.
Source: U. S. Patent Office.

istered it) for a longer period than you have (and yours is registered), chances are that you will not be able to sell your marked product in an area where he has sold his.

The owner of an unregistered mark must prove an additional element (extended use) to overthrow your mark after it has been registered for five years.

Two other ways you can lose your mark after five years: 1. You abandon it. 2. It becomes the common name for the goods (as with aspirin, cellophane, shredded wheat).

You lose registration rights if you: 1. Obtained the mark fraudulently. 2. Used the mark in violating antitrust laws.

To perpetuate your rights, you must reregister every 20 years.

Protecting It — Trademark infringement is unfair competition. If someone appropriates or imitates your registered mark, the courts will grant an injunction. Under certain conditions, you will be able to sue him for the profits he made, plus damages. Should the court be shown that the infringement was flagrant and deliberate, you may get triple damages.

Filing your mark with the Bureau of Customs will prohibit the importation of foreign goods bearing an imitation of your mark.

Trademark Activity — During 1957, American corporations acquired 17,234 new trademarks, reports the United States Trademark Association, vs. 20,758 in 1956 (when the Patent Office worked off a big backlog).

Among new enrollments were abstract marks (Togetherness), unusual marks (Scent-Sation and Pet-Tunia for dog deodorants), and modernizations (Singer Mfg. Co. redesigned its familiar S for the fourth time since it was adopted in 1885).

Other companies are changing their tradenames to incorporate their well-known trademarks. Example: Felt & Tarrant Mfg. Co. has become the Comptometer Corp. Diversifying firms are dropping the mention of products from their names. Examples: American Safety Razor Co. has become ASR Products Corp., while American Locomotive Co. changed its name to Alco Products Inc.

Helpful Hints—Make your trademark easy to spell, pronounce, and remember. Keep it fairly simple in design. Be sure it can be readily affixed to the product.

Coined words are frequently successful. Examples: Exide for batteries, Kodak for photo supplies. Initials and numbers are good: GE of General Electric Co., JM of Johns-Manville Corp., 57 of Heinz Co., and Colorado Fuel & Iron Corp.'s CF&I. Symbols make for many famous marks: Bethlehem Steel Co.'s I-beam, Goodyear Tire & Rubber Co.'s winged foot, Wean Engineering Co.'s double eagle.

Exploit Your Mark—Established trademarks return big dividends when they're affixed to new products: 1. The public is normally leery of something new, but the presence of a well-known mark stimulates confidence. 2. New products also strengthen marks which may be identified with only a few items in a company's line. 3. By putting your mark on a diversity of products, it stands less chance of becoming a common name which is identified with a single product.

Jones & Laughlin Steel Corp. has entirely redesigned its packaging to display the J&L mark on everything from nails to finished bars.

Many companies advise using the mark not only on packaging (or product) and in advertising but also on letterheads, payroll and dividend checks, reports, in plants, and on trucks and company cars.

Word of Warning—The power of a trademark can be abused. Last year, an unscrupulous merchant advertised rebuilt Electrolux vacuum cleaners at prices below cost. Salesmen who called on prospects attracted by the ads disparaged the Electrolux machine in an attempt to sell an expensive cleaner of another make. A federal court issued an injunction to restrain the dealer from further using the trademark.

Summary — Mr. Justice Frankfurter summed up trademark value in a 1942 decision: It is a merchandising shortcut which induces a purchaser to select what he wants, or what he has been led to believe he wants. The owner of a mark exploits this human propensity by making every effort to impregnate the atmosphere of the market with the drawing power of a congenial symbol. He conveys through the mark the desirability of the commodity on which it appears. Once this is attained, the owner has something of value.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

time saved is . . .

money earned

BULLARD

The application of Bullard Man-Au-Trol Vertical Turret Lathes, Model 75, to the machining of aircraft turbine compressor cases clearly demonstrates the superiority of automatic operation.

According to Mr. George E. Saupe, Chief Manufacturing Engineer at Solar Aircraft Co., San Diego, California, these are some of the advantages:

1 Spoilage practically eliminated.

2 Machining time reduced from 14 hours to 1 hour and 42 minutes per unit.

3 In process inspection unnecessary.

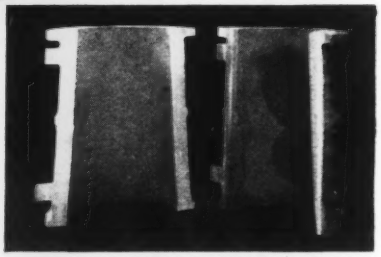
4 Better production control.

5 Reduces error of the operator.

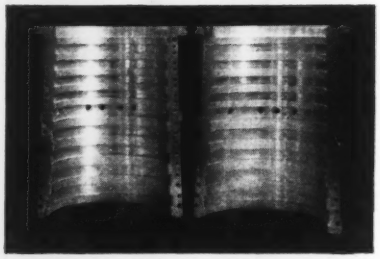
6 Less work in process inventory.

A call, to your nearest Bullard Sales Office or Distributor, can be your first step toward time saved and money earned with your machining problems.

SOLAR JUPITER COMPRESSOR CASE



ROUGH PIECE



FINISHED PIECE

THE BULLARD COMPANY
BRIDGEPORT 9, CONNECTICUT

Ernest R. Breech

Will he retire as Ford's chairman?

James J. Nance

Will his marketing concept win?

R. S. McNamara

Or his manufacturing concept?

Power Battle at Ford Looms

TROUBLE is brewing at Ford Motor Co. Rumor has it that a top management power fight is shaping up.

The basic question is whether marketing or manufacturing men should lead the firm. James J. Nance, 57-year-old vice president and general manager of the Mercury-Edsel-Lincoln Div., is the marketing candidate. Robert S. McNamara, group vice president in charge of the car and truck division, reportedly leads the manufacturing group.

Will He Leave? — Ernest R. Breech, Ford's chairman, is considering retirement. He's 61 this year, and his contract insures him $25,000 a year for life if he leaves for any reason after Feb. 24, 1957.

Henry Ford II hired Mr. Breech to help rejuvenate Ford along GM lines. Autodom believes Mr. Breech was instrumental in bringing Mr. Nance into the organization after he left Studebaker-Packard Corp.

Mr. Breech believes cost controls are the hub of profitable operations, but recently he has indicated that Ford needs a stronger dealer and sales organization. Mr. Nance is the marketing expert who has yet to prove himself to Detroit's satisfaction.

Old Story—Mr. Nance made his mark selling appliances after World War II. (Critics like to point out it was a seller's market.)

Autos came after appliances, but Mr. Nance arrived at Packard too late to build up a marketing group, say his supporters. Now he'll have to produce at Ford.

Consolidated—Within six months, Mr. Nance has become head of

(Material in this department is protected by copyright, and its use in any form without permission is prohibited.)

three former divisions: Mercury, Lincoln, and Edsel. He has also gathered in Ford's International Div., which is gaining greater stature as the small car trend continues.

Apparently, Mr. Nance has had at least tacit approval from Mr. Breech throughout this program. But the feeling is strong that Mr. Breech won't jeopardize the structure he has created if Mr. Nance can't produce.

Tough Time—Timing obviously is important, and 1958 is a poor year to prove marketing skill. Another problem is Mr. Nance's inability to win support among staffmen. Since the consolidation of divisions, there have been heavy job cuts to reduce duplicate staffs (some say salaried personnel reductions are 25 per cent).

Some of the cuts stem from the poor sales showing MEL cars have been making.

A top executive of a rival company predicts: "If Breech has to stay on two more years, Nance will be out at Ford. Breech simply won't give him any longer to make good."

The official does not believe Mr. Nance will be a cinch for the top job even when Mr. Breech departs. Strong opposition comes from an old guard group which is supporting 42-year-old Robert McNamara. Among them reportedly is John Bugas, industrial relations vice president.

Executive Vice President D. S. Harder also is supposed to be a minority member of the old guard. So is D. J. Davis, manufacturing vice president.

Compromise — If Mr. Nance proves to strong, the manufacturing men can offer another choice: Irving A. (Red) Duffy, group vice president in charge of the Tractor & Implement Div., Steel Div., and other administrative and manufacturing units.

How About Henry?—Where does President Henry Ford II stand? While still in his twenties, he returned from the Navy to help regain control of the company. He realized he wasn't trained to run the firm. He was smart enough to get a man who could.

Those who have sat in top level conferences, say Henry Ford II has real ability. "His question: 'What does this really mean?' often has pinpointed loopholes and errors in company plans," says a former Ford official.

There's a rumor that Mr. Ford might like to retire from his office. It's possible that he will move up to chairman when Mr. Breech leaves; in that event, the power struggle would center on the president's chair.

Outlook—So far, scrambling has been far below the surface. Mr. Nance hasn't had time to prove himself. But Detroit feels the reorganization at Ford is far from finished.

One thing is certain: Men like Henry Ford II, Ernest Breech, and John Bugas who fought to save the firm from disaster in the '40s are still around. They'll fight again to retain what they've built up in the last decade.

Will AMC Gamble Again?

American Motor Corp.'s sales comeback has put it solidly in the running as a car builder. Now autodom wonders if AMC will be willing to gamble again to retain its position.

Three years ago, only George Romney, AMC president, thought there was much of a future for the small car in America.

Partly through perseverance and partly through the sales impact of foreign economy cars, the Rambler gamble has paid off. Sales are up 66 per cent from last October's. Employment is 18,000, up 25 per cent from what it was a year ago.

Company assets stood at $186 million on Dec. 31; working capital totaled $52.5 million. Bank loans are down to their lowest level (under $18 million) since the merger of Hudson and Nash-Kelvinator three years ago.

No Choice—But autodom adds: "AMC gambled, but it had no choice. It was a case of be different or be bankrupt." By 1960, Mr. Romney's compact car will have more followers from Big Three ranks. Competition will be rough, particularly if the small car market levels off near half a million, as many expect.

It will take more than styling changes or new models to stay on top when that happens. Autodom thinks AMC will have to bring out another radical concept. Something like a turbine or free piston engine will be needed.

U. S. Auto Output

Passenger Only	1958	1957
January	489,357	641,591
February	392,112	571,098
2 Mo. Total	881,469	1,212,689
March		578,826
April		549,239
May		531,365
June		500,271
July		495,629
August		524,354
September		284,265
October		327,362
November		578,601
December		534,714
Total		6,117,315

Week Ended	1958	1957
Feb. 8	109,028	147,163
Feb. 15	101,656	145,846
Feb. 22	89,977	138,938
Mar. 1	91,508	140,362
Mar. 8	83,133†	140,161
Mar. 15	80,000*	141,038

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Progress Report: Argonaut

The Argonaut, first Cleveland-built passenger car in 26 years, will be introduced this spring, says Richard S. Luntz, president of Argonaut Corp.

Styles—In addition to its classic, two-seat roadster (STEEL, Aug. 26, 1957, p. 49), Argonaut will offer a streamlined roadster, a four-passenger closed car, a four-passenger convertible, and a limousine (six, seven, or nine passengers). Wheel base of the limousine is 148 in. (vs. 149.75 in. of Cadillac's Fleetwood 75).

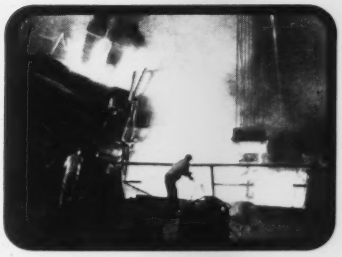
Mr. Luntz calls the roadster the Texan—the only car in the line with a reinforced plastic body.

All Argonauts except the Texan have aluminum bodies. Designed in the U. S., they're hand formed in Italy. Cleveland-built chassis are shipped to Italy for final assembly.

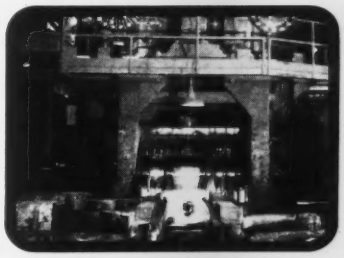
Luxury Item—"The price will depend upon the special equipment and fittings that are ordered," says Mr. Luntz. "Some of our cars may cost more than $20,000. But we want to emphasize that the Argonaut is designed for long use."

ANOTHER COPPERWELD SERVICE

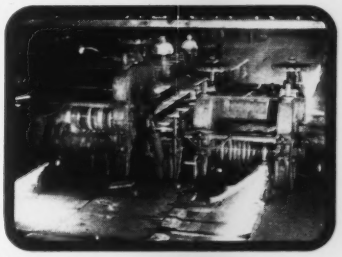
complete cold finishing facilities



Electric Furnace.



Ingot entering 35" Blooming Mill.



12" Bar Mill in operation.

From electric furnaces to cold finishing—close metallurgical control is the secret of the uniform quality of Aristoloy blooms, billets and bars.

Starting with select raw materials, and exercising special care in melting and teeming operations, Copperweld produces the special Aristoloy ingot. From here, conditioning, rolling, thermal treatment, and cold drawing are under the same careful scrutiny . . . the same control. The result—steels of uniform quality bearing the name Aristoloy!

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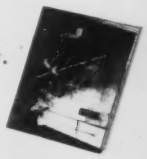
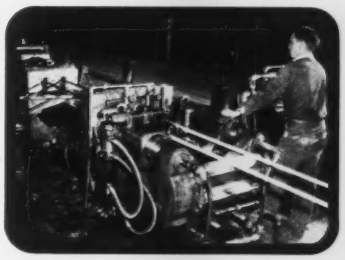
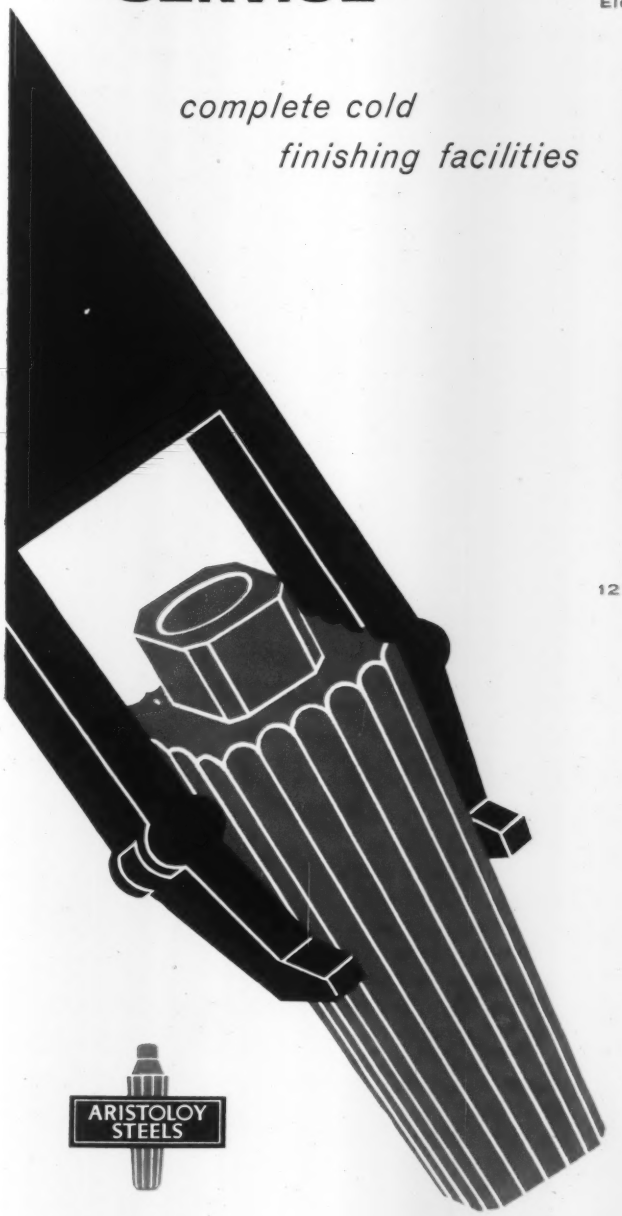
New Leaded Steel Catalog now available. Write for your copy today.





Cold Drawing.



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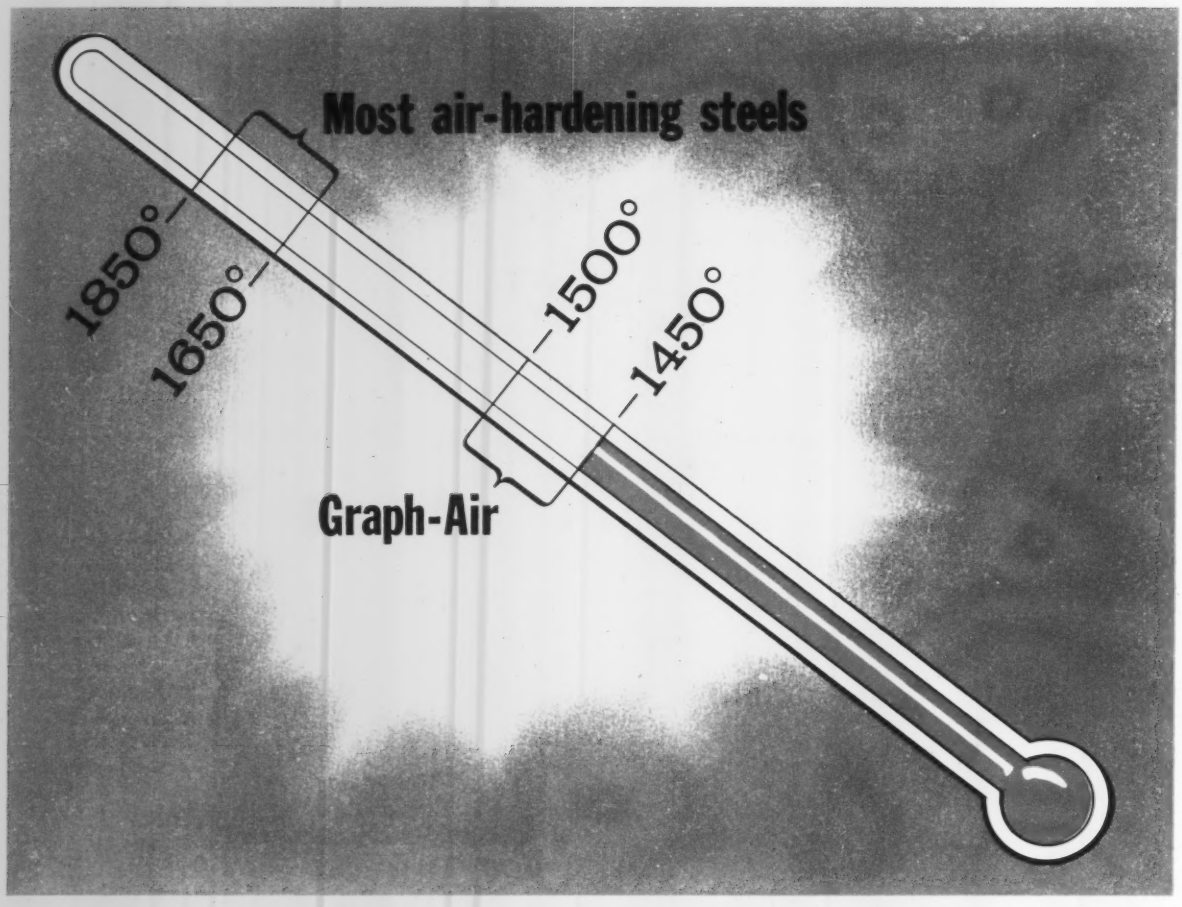

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TEMPERATURE as low as 1450°F. is high enough to air-harden Timken Graph-Air® tool steel. That's as much as 400° lower than most other air-hardening tool steels. Because of this, you reduce distortion and simplify heat treat control. And surface scaling and decarburization are minimized.

Graph-Air machines faster, too, because of its graphitic structure. And it's tougher—outwears ordinary tool steels because of the uniform, diamond-hard carbides in its structure.

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For a high quality tool steel that air-hardens at lowest temperature, specify Graph-Air. Available in solid and hollow bar sizes. For further information, please write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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TRADE-MARK REG. U.S. PAT. OFF.

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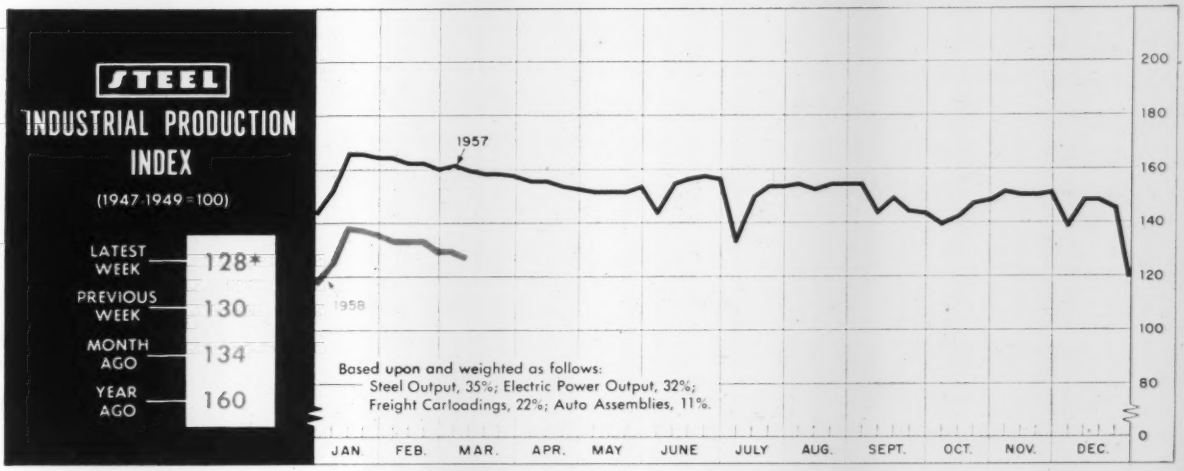

Week ended Mar. 8.

Six Indicators Spur Hopes for Upturn

FOR THE FIRST time in weeks, some business facts tend to indicate that the recession is nearing its end. Six barometers of the economic climate are either holding steady or turning up a little. It is too early to call the turn, but the appearance of so many favorable signs at one time could be significant.

No. 1, Construction—One of the best reports comes from the construction industry, which has been a mainstay for several years. Both contract awards for heavy construction and work put in place showed gains in February. *Engineering News-Record* reports that contracts increased for the second consecutive time last month, moving to $1.17 billion—17 per cent better than the January figure.

Private contracts rose 47 per cent above the January weekly rate, with every category contributing. Especially impressive was the gain of 67 per cent made by industrial building awards. Federal work also gained, moving up 36 per cent.

The improvement seems to be continuing in March. For the week ended Mar. 6, awards climbed to $365.1 million, exceeding the year-ago figure for the first time in 14 weeks. Contracts for the year to date are still 18 per cent below those of the corresponding 1957 period, but the gap only one month ago was 24 per cent.

The Department of Commerce reports that work put in place last month set a new high for February at $3.1 billion. It brought the total for the first two months of the year to $6.3 billion, also a new high for the period.

No. 2, Carloadings—Freight carloadings for revenue, one of the weakest segments of the economy for many weeks, showed impressive strength during the week ended Mar. 1. The Association of American Railroads reports 553,645 carloadings, the highest level since the week ended Jan. 18, and a whopping 61,256 cars above the preceding week's rate. Every category ex-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,442[1]	1,425	2,401
Electric Power Distributed (million kw-hr)	11,800[1]	11,803	11,867
Bituminous Coal Output (1000 tons)	8,445[1]	6,790	9,660
Crude Oil Production (daily avg—1000 bbl)	6,825[1]	6,841	7,813
Construction Volume (*ENR*—millions)	$365.1	$304.7	$320.4
Auto, Truck Output, U. S., Canada (*Ward's*)	108,155[1]	117,471	169,053
TRADE			
Freight Carloadings (1000 cars)	525[1]	554	672
Business Failures (Dun & Bradstreet)	331	317	284
Currency in Circulation (millions)[3]	$30,562	$30,542	$30,565
Dept. Store Sales (changes from year ago)[3]	+1%	−18%	−5%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$23,628	$20,877	$23,824
Federal Gross Debt (billions)	$275.1	$274.9	$276.2
Bond Volume, NYSE (millions)	$24.3	$19.8	$20.5
Stocks Sales, NYSE (thousands of shares)	10,452	8,623	9,048
Loans and Investments (billions)[4]	$87.4	$87.0	$85.0
U. S. Govt. Obligations Held (billions)[4]	$26.9	$26.5	$25.7
PRICES			
STEEL's Finished Steel Price Index[5]	239.15	239.15	227.41
STEEL's Nonferrous Metal Price Index[6]	202.4	201.7	239.6
All Commodities[7]	119.4	119.2	116.8
Commodities Other than Farm & Foods[7]	125.8	125.8	125.3

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1958, 2,699,173; 1957, 2,559,490. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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STEEL
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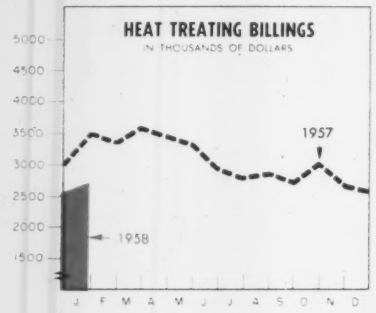
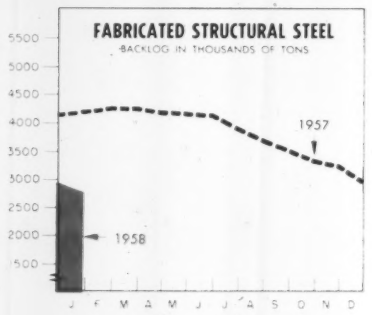
THE BUSINESS TREND





	1958	1957	1956
Jan.	2,780.4	3,533.9	3,116.4
Feb.	.....	3,337.9	3,124.8
Mar.	.....	3,571.6	3,330.9
Apr.	.....	3,462.6	3,166.2
May	.....	3,311.4	3,350.7
June	.....	2,912.1	3,094.5
July	.....	2,767.5	2,737.4
Aug.	.....	2,830.8	3,136.6
Sept.	.....	2,708.8	2,858.6
Oct.	.....	3,021.6	3,468.5
Nov.	.....	2,641.4	3,238.2
Dec.	.....	2,565.4	2,998.9

Metal Treating Institute.

	Shipments		Backlogs	
	1958	1957	1958	1957
Jan.	316.7	290.1	2,778	4,194
Feb.	.....	319.0	.....	4,262
Mar.	.....	342.4	.....	4,245
Apr.	.....	362.2	.....	4,192
May	.....	377.3	.....	4,172
June	.....	384.7	.....	4,134
July	.....	342.5	.....	3,907
Aug.	.....	383.8	.....	3,707
Sept.	.....	338.6	.....	3,521
Oct.	.....	384.8	.....	3,322
Nov.	.....	334.1	.....	3,233
Dec.	.....	320.2	.....	2,959
Totals	.....	4,179.7		

American Institute of Steel Construction.

Charts copyright, 1958, STEEL.

cept coke increased in the latest period. Miscellaneous freight (includes most of metalworking) was the biggest gainer.

No. 3, Store Sales—For the first time in six weeks, department store sales showed an advantage over the year-ago period during the week ended Mar. 1. The 1 per cent gain came after deficits as large as 18 per cent in preceding weeks. Weather was an important factor.

No. 4, Machine Tools—Following the announcement that orders increased slightly in January (see STEEL, Mar. 10, p. 73), builders have been reporting more significant upturns in February. One survey reveals that a large majority of 17 leading manufacturers have become more optimistic about orders during the past month.

No. 5, Car Sales—Even though the upturn in new car sales in late February leaves much to be desired, many industry observers are looking for a continuation of the trend into March and the customary plush spring season. Again, weather was a primary factor. Sunshine during the last couple of weeks has warmed up a lot of salesrooms. *Ward's Automotive Reports* points out that the January-February record was still 250,000 units below the year-ago period, which is far from a revival.

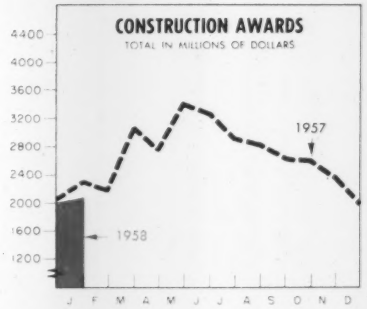
No. 6, Coal — Bituminous coal production during the week ended Mar. 1, hit its highest level in six weeks, reports the National Coal Association. The estimate is 8,445,000 net tons, the best output since the week ended Jan. 11.

It would be unwise to predict a turn in the trend on this evidence alone. But developments in the next few weeks could tell the story.

Orders Take Big Drop

Businessmen found little to cheer about in the Commerce Department's business report for January. About the only good news was another sizable decline in manufacturers' inventories. Many observers feel that the $600 million cutback (seasonally adjusted) brings inventories pretty close to the minimum point and that buying should pick up soon. Practically all the liquidation came in the durable goods sector. At the same time, shipments declined by $400 million, all of it in durable goods.

New orders tumbled again, hitting $24.2 billion for all manufacturing (compared with $25.1 billion in December) and $10.6 billion for durable goods (compared



	1958	1957	1956
Jan.	3,045	7,380	10,244
Feb.	....	8,373	12,163
Mar.	....	9,090	7,025
Apr.	....	3,164	8,803
May	....	3,994	3,667
June	....	2,974	4,748
July	....	4,332	4,140
Aug.	....	3,924	6,722
Sept.	....	2,337	3,057
Oct.	....	3,621	8,741
Nov.	....	2,832	3,986
Dec.	....	3,992	5,858

*Not including new orders for steel mill furnaces.
Industrial Heating Equipment Assn. Inc.

	Total		Building	
	1958	1957	1958	1957
Jan.	2,066.1	2,299.6	1,536.2	1,730.7
Feb.	....	2,161.0	....	1,695.5
Mar.	....	3,078.0	....	2,199.7
Apr.	....	2,776.4	....	2,069.7
May	....	3,399.5	....	2,416.8
June	....	3,243.5	....	2,341.5
July	....	2,900.7	....	2,247.6
Aug.	....	2,818.0	....	2,291.8
Sept.	....	2,624.9	....	2,092.2
Oct.	....	2,613.8	....	2,075.6
Nov.	....	2,370.7	....	1,808.5
Dec.	....	1,982.3	....	1,457.5
Totals	....	32,268.4	....	24,427.1

F. W. Dodge Corp.

with $11.4 billion in December).

Manufacturers continued to eat up their backlogs, bringing the level at the end of January down $2.6 billion to $49.1 billion. All the cut came in durable goods.

Recession Called Moderate

Dr. Geoffrey H. Moore, associate director of the National Bureau of Economic Research, is one economist who doesn't take this recession lightly. He has been measuring it with others that followed World Wars I and II and concludes that it is going to be at least as severe as the dips in 1948-49 and 1953-54.

He has come up with 14 indicators which measure contraction and expansion of business. Six indicate the current recession has been milder than the last two. They are: Nonfarm employment, changes in the unemployment rate, physical volume of industrial production, bank debits outside New York, personal income, and retail sales.

The other indicators lead business conditions—six tend to show the dip is more severe than other post-World War II declines. They are: Average workweek in manufacturing, durable goods orders, residential construction contracts, commercial and industrial construction contracts, business incorporations, and liabilities of business failures. Basic commodity prices and industrial stock prices are neutral factors.

Dr. Moore concludes that the 1957-58 decline is an "intermediate or moderate recession."

Trends Fore and Aft

• The government's weekly wholesale price index continues to climb because of higher farm product prices. It reached 119.4 (1947-49 = 100) for the week ended Mar. 4. The index for all commodities other than farm and foods is 125.8, just where it stood 12 weeks ago.

• Billings for heat treating totaled $2,780,400 in January, 21.3 per cent under the year-ago figure (see chart, Page 62). It was the sixth month in a row in which current billings have lagged behind those of the year-ago period.

• Production patterns in the appliance industry were all mixed up in January. Shipments of domestic gas ranges were off the December pace by about 6000 units, but shipments of gas-fired water heaters were up by 65,000 units. Home washer factory sales were up 15 per cent, dryer sales down 16 per cent.

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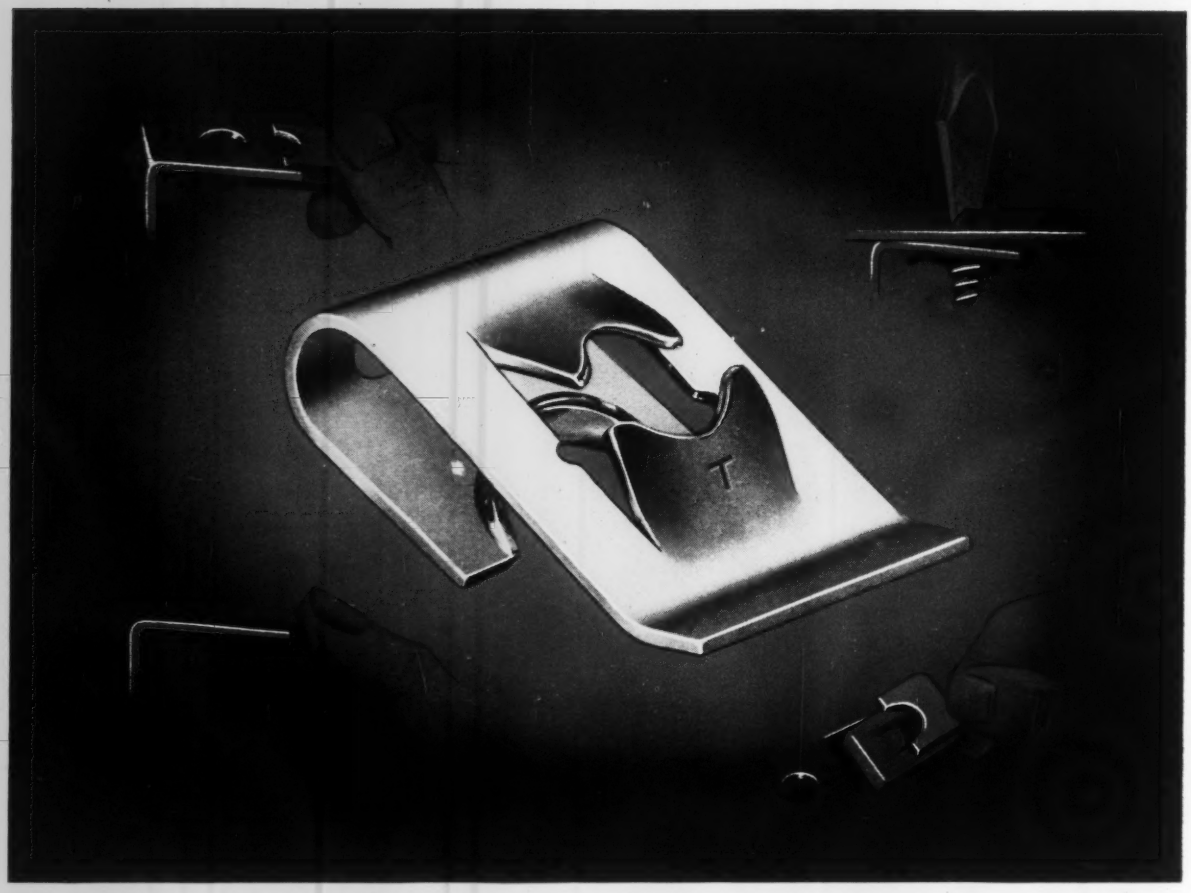

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CHRIS F. VanRAAPHORST
joins Bridgeport Brass

J. V. NAISH
Convair president

ALTER HURWITZ
Lewyt Mfg. p.a.

LOUIS J. PEDICINI
Tann Corp. post

Chris F. VanRaaphorst, formerly with Waterbury Mfg. Div., Chase Brass & Copper Co., joined **Bridgeport Brass Co.** as manager of its Norwalk, Conn., plant.

J. V. Naish was elected president, **Convair**, a division of General Dynamics Corp., San Diego, Calif., succeeding **Gen. Joseph T. McNarney** who retires Apr. 1. Mr. Naish, former executive vice president of Convair, also was named a senior vice president of General Dynamics.

William A. Haist Jr. was named president, **Detroit Controls Division**, American Radiator & Standard Sanitary Corp., Detroit. He succeeds **Charles H. Hodges Jr.**, who was appointed to direct a special growth and development study in the controls and instrumentation field for the corporation, with headquarters in Detroit.

Walter R. Whittle was made advertising and marketing director, **Cullman Wheel Co.**, Chicago.

Harry B. Burrack was made technical superintendent, **Olin Aluminum Div.** rolling mill, Olin Mathieson Chemical Corp. The mill is between Clarington and Hannibal, Ohio.

Frank G. Helander joined **Loewy-Hydropress Div.**, Baldwin-Lima-Hamilton Corp., New York. He was manager, hydraulic press division, Birdsboro Steel Foundry & Machine Co., and previously served as executive vice president, Watson-Stillman Co.

Alter Hurwitz was made manager of purchasing, **Lewyt Mfg. Corp.**, Brooklyn, N. Y. (electronic and electromechanical equipment). In addition he will direct purchasing for Lewyt Corp., also of Brooklyn (vacuum cleaners). Mr. Hurwitz was head of purchasing for the electronic division.

Oswald Tower Jr. was made sales manager, **Michigan Seamless Tube Co.**, South Lyon, Mich. He continues duties as assistant to the president, a position he has held for the last year. He formerly was plant superintendent.

J. Frank McKiernan was made general manager, **Daybrook Hydraulic Div.**, Young Spring & Wire Corp., Detroit. He succeeds **T. W. Helwig**, recently made group executive in charge of Daybrook and of Young's Ottawa, Kans., Steel Div.

Webster Engineering Co., Tulsa, Okla., subsidiary of Surface Combustion Corp., elected **Leon S. Regan** president to succeed **Frank H. Adams**, now chairman. **George C. Bergtholdt**, vice president, was made vice president-general manager, succeeding Mr. Regan.

F. R. Cruse was made sales manager, stainless processing division, **Wall Colmonoy Corp.**, Detroit. He was assistant sales manager.

Rowland Erving was appointed sales manager, chain division, **McKay Co.**, Pittsburgh. He was assistant sales manager, and is succeeded by **Joseph C. Carey**, former Pittsburgh district representative.

Louis J. Pedicini was made manager of manufacturing engineering, **Congress Die Casting Div.** and **Congress Drives Div.**, Tann Corp., Detroit. He was staff engineer in charge of the metal casting department, General Motors Corp.

William F. Briney was named manager of industrial products sales for **Solar Aircraft Co.**, San Diego, Calif. He was with Le Roi Div., Westinghouse Air Brake Co., as manager of construction industry sales.

William H. Hendrickson Jr. was elected president, **Welding Engineers Inc.**, Norristown, Pa., to succeed **John P. Hendrickson**, now chairman. **John G. Hendrickson** was elected vice president; **Charles R. Hires**, vice president-manufacturing.

James L. Arthur was elected vice president-sales, **Calstrip Steel Corp.**, Los Angeles.

William C. Wichman was made general manager, **General Electric Supply Co. Div.** (GESCO), at Bridgeport, Conn., for General Electric Co. He succeeds **Charles R. Pritchard**, GE vice president, who becomes special consultant to the division. Mr. Wichman, also a GE vice president, was general manager, industrial power components division. That division will be discontinued.

Kent P. Shaver fills a newly created sales engineering post at **Huppower Div.**, Hupp Corp., Detroit. He was sales manager, R. L. Kuss Co.

David S. Binder was made Cleve-

FRED L. STETTNER

M. F. COYNE

Victor Equipment vice presidents

J. J. LINCOLN JR.

J. H. KEENEY

Air Reduction promotions

land branch manager, **Mann Engineering Co.**

Fred L. Stettner, plant manager, **Victor Equipment Co.**, San Francisco, was elected vice president-engineering and production. **M. F. Coyne** was elected vice president, gas division. Mr. Coyne was president, California Oxygen Co., recently acquired by Victor.

William Guy was made assistant chief engineer, **Harris Calorific Co.**, Cleveland. He was assistant chief engineer in charge of production engineering for Aro Equipment. Previously he served as section chief engineer for aircraft at Wright-Patterson Air Force Base.

John W. Black was made manager of **Hughes Aircraft Co.'s** Tucson, Ariz., plant. He succeeds the late **George Sinclair. Louis L. Reasor** succeeds Mr. Black as assistant plant manager.

Reliance Electric & Engineering Co. appointed regional sales managers: **Elwood H. Koontz**, Pittsburgh district manager, moves to Chicago to succeed **R. O. Herbig**, who retires this spring as central west regional sales manager. **Andrew C. Perrin** advances from district sales manager, San Francisco-Pacific Northwest district, to western regional sales manager, continuing headquarters in Burlingame, Calif.

William McNeil was made New York district sales manager, **Jones Machinery Div.**, Hewitt-Robins Inc.

Dr. Miro A. Grottger joined **Industrial Finishes Co.**, Philadelphia, as vice president and director of research. He was with Walker Bros.

J. J. Lincoln Jr. was appointed president, **Pure Carbonic Co.**, division of **Air Reduction Co. Inc.**, New York. He succeeds **E. R. Lawrence**, now chairman of the division. **J. H. Keeney** succeeds Mr. Lincoln as **Air Reduction Sales Co.** vice president-southern region, with offices in Houston. **L. T. D. Berg** succeeds Mr. Keeney as marketing manager-equipment, Air Reduction Sales Co., New York. **A. J. Thoma**, controller, parent company, was elected vice president-controller.

Robert Aldag was made railroad division manager, **Fairbanks, Morse & Co.**, Chicago. He was manager of the sales engineering department.

Frederick Keller was elected president, **Thomas Industries Inc.**, Louisville, to succeed **Lee B. Thomas**, now chairman. Mr. Keller was vice president and director of sales.

Ogden C. White was elected vice president-marketing, **Ditto Inc.**, Chicago. He succeeds **Larry A. Watkins**, resigned. Mr. White was vice president of George Fry Associates, management consultants.

George J. Crowdes was made chief controls engineer of **Assembly Products Inc.**, Chesterland, Ohio. Before joining the firm last August, he was with B. F. Goodrich Co.

O. P. Carter was elected president, **Midwest Piping Co. Inc.**, St. Louis. Former executive vice president, he succeeds the late **Eric A. Kerbey.**

Lockheed Aircraft Corp., Burbank, Calif., appointed **M. Carl Haddon** as its California division director-marketing to succeed **Leonard K. Schwartz**, who resigned to become a vice president of Hughes Tool Co. Mr. Haddon was chief engineer of the division, and is replaced by **Robert A. Bailey**, former chief advanced systems research engineer. **Arthur E. Flock** replaces Mr. Bailey.

John R. Smyth, former chief control engineer, was named to a new post of assistant director of engineering at **Exide Industrial Div.**, Electric Storage Battery Co., Philadelphia.

William Jackson was named engineering director at **Bine-McPherson Co. Inc.**, San Diego, Calif.

Martin M. Reed was elected president, International Div., **Harris-Intertype Corp.**, Cleveland, and a vice president of the corporation. He recently resigned as president, Mergenthaler Linotype Co.

Berj Hogopian was elected president, **Transval Engineering Corp.**, Culver City, Calif., to succeed **George Otis**, resigned. **R. M. Elwood** was made vice president-sales and contracts; **Clyde Norton**, vice president-engineering.

Clarence E. Becker was made manager of manufacturing; **Raymond E. Lewis**, sales manager for **Buflovak Equipment Div.**, Blaw-Knox Co., Buffalo.

George L. Scripps was named assistant manager of **Caterpillar Tractor Co.'s** Milwaukee plant.

Bernard Bernstein was made general manager of the new Advanced Development & Systems Div., **Gulton Industries Inc.**, Metuchen, N. J. The division integrated four departments: Ordnance systems de-

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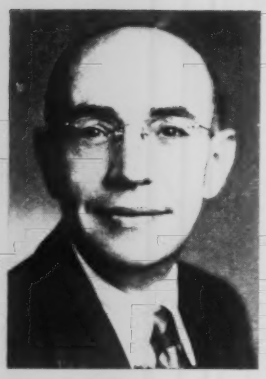


W. RAYMOND LOCKWOOD
Ryerson machinery div. mgr.

EDWARD J. UDICK
Weirton sheet mill mgr.

CARL F. STUGARD
Cincinnati Milling sales v. p.

DAN E. HARRISON
True-Trace v. p.

partment; Underwater Sound Laboratory; fuse development group; and the atomic energy research program.

Robert T. Stafford was made general manager of the Seattle steel service plant of **Joseph T. Ryerson & Son Inc.** He succeeds **W. Raymond Lockwood**, made manager of the machinery division, Chicago. **Ernest L. Younts**, former manager, was named machinery consultant.

George A. Pyle was appointed manager-stainless steel products sales, **American Steel & Wire Div.**, Cleveland, U. S. Steel Corp. He succeeds **Banks E. Eudy**, retired.

J. Stokes Gillespie was made general manager of **General Electric Co.'s** gear motor and transmission components department at Paterson, N. J. He succeeds **Lewis J. Burger**, recently made general manager, gas turbine department, Schenectady, N. Y. Mr. Gillespie was manager of engineering for the metallurgical products department, Detroit.

E. R. Lund was made San Francisco district manager, **ElectroData Div.**, Burroughs Corp. He succeeds **J. P. Leebrick**, named manager of the Los Angeles district. **R. H. Wagner**, former Los Angeles district manager, was named Burroughs International Div. sales promotion manager for electronic products. He is at Detroit.

United States Steel Corp. appointed **J. Gardner Brooks** manager of sales-Indianapolis to succeed **Gladstone C. Hill**, named sales manager-St. Paul. **Jack R. Scott** was named assistant sales manager-Chicago, succeeding Mr. Brooks.

Edward J. Udick was named manager, sheet mill department, **Weirton Steel Co.**, Weirton, W. Va., division of National Steel Corp. He succeeds **T. P. Caine**, retired. **Harold E. McDougle** was made assistant manager. He was assistant superintendent, galvanizing department of the sheet mill.

Carl F. Stugard was elected a vice president, **Cincinnati Milling & Grinding Machines Inc.**, Cincinnati, sales subsidiary of Cincinnati Milling Machine Co. He was manager, special machine tool division.

At **General Electric Co.'s** Buffalo transistor manufacturing plant, **T. J. Cappello** was named manager of quality control; **Fred J. Feller**, manager of materials and inventory control; **W. Jesse Harber Jr.**, manager of manufacturing engineering.

John N. Raines was made manager-market planning, military products division, **International Business Machines Corp.**, New York. **John W. Luke** was named sales manager of the division.

Robert C. Hessinger was made a metallurgical engineer in the powder metallurgy department at Latrobe, Pa., for **Vanadium-Alloys Steel Co.**

Jerry M. Gruitch, director of research and development, **American Car & Foundry Div.**, ACF Industries Inc., New York, assumes the new post of director of defense products.

N. F. Moody was made Philadelphia district manager; **H. F. Colt Jr.**, Boston district manager, **Air Reduction Sales Co.** Mr. Moody replaces **E. B. Walker**, retired.

Dan E. Harrison was elected vice president and general manager, midwestern division, **True-Trace Sales Corp.** He will direct operations of the Racine, Wis., and Westbury, N. Y., plants.

Gerald A. Tamblyn was named sales manager of the new industrial tractor shovel line of **Yale Materials Handling Div.**, Yale & Towne Mfg. Co., Philadelphia.

L. D. Reiff, in addition to duties as vice president, **Superior Steel & Malleable Castings Co.**, Benton Harbor, Mich., was appointed general manager-manufacturing.

OBITUARIES...

Thomas W. McNeill, 57, director of procurement, **American Radiator & Standard Sanitary Corp.**, New York, died Mar. 4.

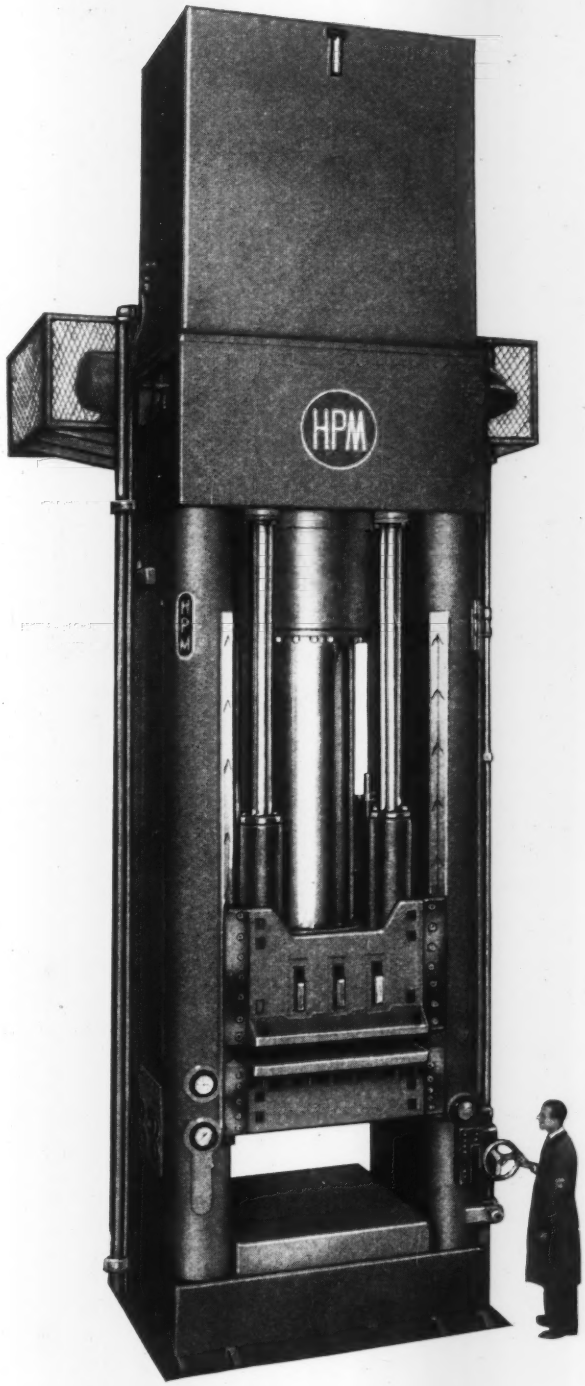
Gilbert E. Webster, 57, president, **National Lock Washer Co.**, Newark, N. J., division of American Seal-Kap Corp., died Mar. 3.

Rockwell B. Ward, 43, vice president, **Parsons Diamond Product Co.**, Hartford, Conn., died Mar. 1.

Harold T. Blair, 55, a metallurgical engineer for **Republic Steel Corp.**, Cleveland, died Mar. 2.

Henry C. Brelie, 78, president and founder, **Brelie Mfg. Co. Inc.**, Milwaukee, died Feb. 25.

Harry E. Metz, 51, vice president-manufacturing, **Landers, Frary & Clark**, New Britain, Conn., died Mar. 3.



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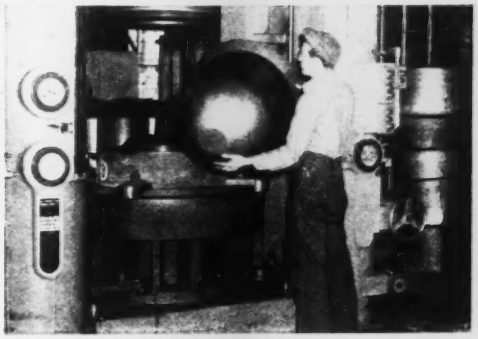

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Mr. Homer F. Folk, Manager of Pressed Steel Department at A. C. F. Industries, Milton, Pa., reports, "We need an all-around versatile press and our H-P-M can be easily and quickly set-up and regulated for each specific draw job. The accurate control of drawing speed plus total elimination of high impact stresses guarantees proper metal flow and is one of the important factors in making reductions of 50% in one operation possible."

The H-P-M FASTRAVERSE press is infinitely adjustable for a multitude of drawing requirements. Independent control of each hydraulic action provides just the right tonnage for each job. Investigate these versatile all-hydraulic production units. Draw your sheet metal hydraulically. Write today for complete information.

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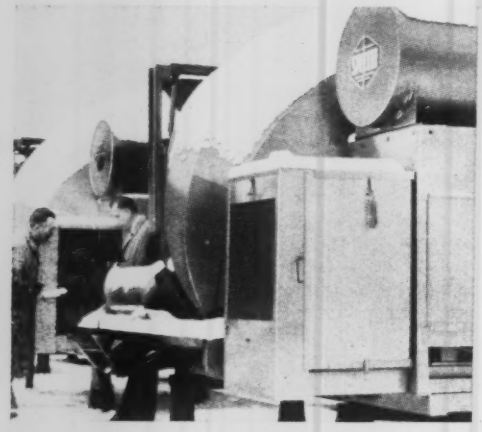
HPM

why T. L. Smith Co. powers with Chrysler Industrial Engines

T. L. SMITH EXECUTIVES, Richard R. Kupfer, Director of Purchases (left); Raymond W. Mueller, Project Engineer, inspect Chrysler Ind. 30 Engine which powers all T. L. Smith separate engine mixers—nine models, 5 to 9 yard capacity.



Ready-mix concrete mixers demand rugged power. Most work, for example, is off the road and the mixer engine is subjected to severe jolting and sudden load shifts. The engine is also forced to operate in an atmosphere of abrasive cement dust. The engine is required to turn drum loads ranging up to 40,000 lbs. Operating speeds fluctuate suddenly from 2400 rpm during loading to 800 rpm during agitation.

T. L. Smith Co. has found that Chrysler Industrial Engines are engineered and built to meet these rugged demands better than any other engine in the field. Chrysler's fluid coupling, for example, absorbs sudden load shocks, prolongs engine life. Chrysler's efficient oil-bath air cleaner keeps harmful cement dust from fouling the engine. Chrysler Engines have also proved able to operate at continuous low speeds under heavy loads for long periods without excessive carbon build-up. Most important, Chrysler's day-in, day-out dependability means minimum down time for T. L. Smith customers. In fact, many Chrysler-powered units which are still on the job after six and seven years have never had a major maintenance problem.

SEND for 1958 CHRYSLER INDUSTRIAL ENGINE CATALOG
Dept. C3, Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan.

Chrysler
INDUSTRIAL ENGINES
INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION

Stelco Expands

$25-million blooming mill is placed in operation at Hamilton Works. Other units planned

STEEL CO. of Canada Ltd. has formally started production on a new $25-million blooming mill at its Hamilton (Ont.) Works. The 10,000-hp giant is said to be one of the most fully automated bloom mills in the world.

It is a major part of a $70-million expansion program that is nearing completion at the Hamilton Works. The mill is expected to be the nucleus of a much larger facility. Following expansion of the blooming mill department will come new open hearths, new plate mills, and allied facilities.

Provision has been made for the installation of additional soaking pits and adding an edging mill unit to the mill. This would convert it to a universal slabbing mill with a potential capacity of 5 million tons a year.

Acquires Nestier Div.

Metal Specialty Co., Cincinnati, purchased the Nestier Div. of the Charles Wm. Doepke Mfg. Co., Rossmoyne, Ohio, and will operate it as a subsidiary under the name of Nestier Corp. Nestier makes metal boxes, baskets, hopper racks, and assembly feeders for small part material handling systems.

Integrates Missile Work

American Machine & Foundry Co., New York, changed the status of its Associated Missile Products Corp., Pomona, Calif., from a subsidiary to a division. Dr. W. B. Sell has been named general manager, supplementing his duties as a divisional vice president of AMF. The Pomona firm will be known as the Associated Missile Products Co. R. L. Hull continues as vice president and assistant general manager; Dr. J. Tampico, vice president in charge of engineering. "This move coupled with the recent decision to phase into Pomona the work formerly assigned to the company's Boston electronics operation will provide a singularly integrated electronics engineering and manufacturing facility," says Morehead Patterson, AMF board chairman and chief executive officer.

Forms Cimastra Div.

Cincinnati Milling Machine Co., Cincinnati, has set up a Cimastra Div. to fabricate and market a new reinforced glass fiber product. Production is underway and additional processing equipment is being installed.

Buys Furnace Controls

Columbia-Geneva Steel Div., U. S. Steel Corp., San Francisco, purchased controls to improve the fuel efficiency of ten open hearth furnaces at its Geneva Works, Geneva, Utah, and five furnaces at its Pittsburg, Calif., plant. The contract was awarded to Leeds & Northrup Co., Philadelphia.

Kaiser Enlarges Plant

Kaiser Aluminum & Chemical Corp., Oakland, Calif., completed construction of two large buildings at its plant at Chalmette, La. The structures house the ninth potline at the aluminum reduction plant.

Parker Seal Co. Formed

Parker-Hannifin Corp., Cleveland, has united its Parker Rubber Div. and Franklin C. Wolfe Div. to form Parker Seal Co. as an operating division. Administrative headquarters of the new unit will be in Culver City, Calif., under the direction of Paul F. Smith as general manager. Scott A. Rogers, assistant general manager with direct responsibility for eastern operations, and T. J. McCuistion, sales manager, will maintain offices in Cleveland. The division specializes in the manufacture of rubber and metal seals for fluid systems.

Cleveland Firm Renamed

Cleveland Fuel Equipment Co., Cleveland, changed its name to Cleveland Controls Inc. A diversification program is carrying the firm deeper into the manufacture of electric and electronic controls for use in the power, heat, and process fields.

Signs Licensing Agreement

Heppenstall Co., Pittsburgh, has signed a licensing agreement with Wilhelm Scheidt, Kettwig, West Germany. Scheidt will manufacture and distribute Heppenstall material handling equipment in West Germany; Heppenstall will be the exclusive distributor of Scheidt material handling equipment in the U. S. and Canada. Heppenstall's Materials Handling Div., New Brighton, Pa., makes automatic and motorized tongs, sheet lifters, motorized rotating hooks, "C" hooks, and tilting devices.

Obtains Line of Welders

Federal Machine & Welder Co., Warren, Ohio, acquired control of the Berkeley-Davis line of automatic welding machines.

Gains Control of Curtis

Control of Curtis Screw Co. Inc., Buffalo, has been acquired by two officers of the company, H. G. Smith and H. F. Curtiss. They have been elected president and vice president, respectively.

Hawkridge Buys Plate Line

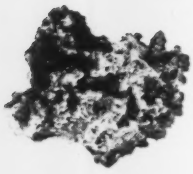
Hawkridge Bros. Co., Boston, metal warehousing firm, purchased Monsanto Chemical Co.'s Planishing Plate Div., Springfield, Mass. Planishing plates, which are basically steel, are used in the finishing of plastic sheets to an ultrasmooth finish.

Beloit Iron Forms Division

Beloit Iron Works, Beloit, Wis., created a Foundry & Machine Div. having these facilities: A mechanized foundry for ductile iron, cast iron, semisteel, bronze, and aluminum, making castings from 5 lb to 40 tons; a fabrication shop for machine frames, bases, and special applications; and a machine shop capable of performing almost any operation on the castings and fabrications the division makes, including roll grinding and gear hobbing. Equipment includes three normalizing furnaces, a roll foundry, and an x-ray vault using the cobalt 60 process. Bond & Den Uyl Asso-

(*Please turn to Page 75*)

Dravo sinter plant



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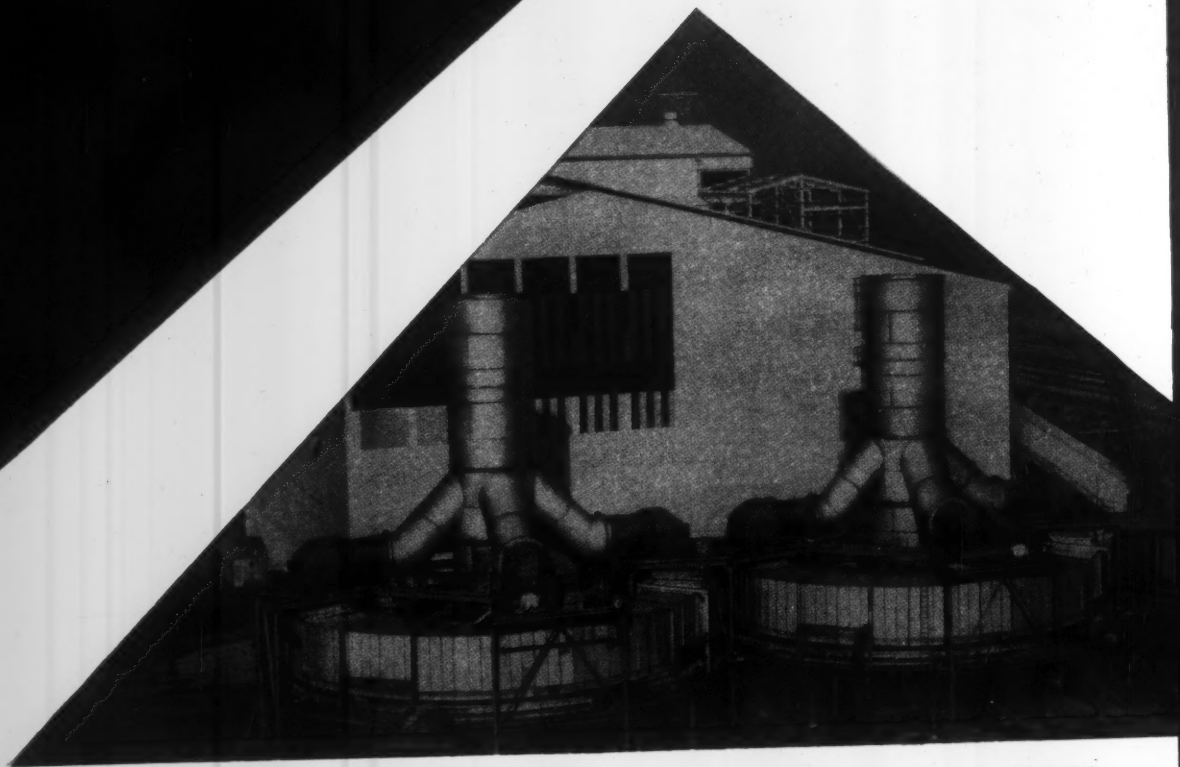
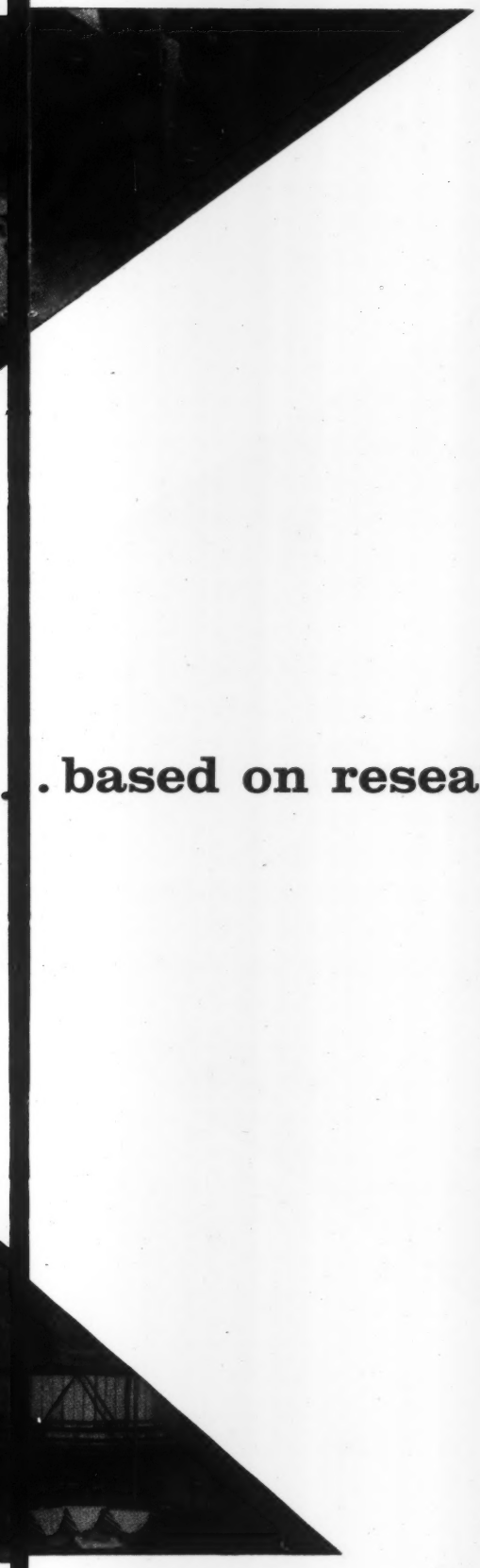


STEEL



. based on research

Research plays a major role
in the design
of Dravo-Lurgi sinter plants.
Many of the basic design features
are the result of years
of Lurgi experience and research, adapted to
American standards by Dravo.
The design of each plant
is based on sintering characteristics
of the ores to be processed as determined by
exhaustive testing procedures at
Dravo's Research Center.
Complete facilities, extensive experience and
painstaking attention to detail
qualify Dravo as a prime source
of sinter plant design
and construction.
Why not discuss your sintering plans
with a Dravo engineer.
A letter or phone call
will receive prompt attention.
Dravo Corporation,
Dravo Building, Pittsburgh 22, Pa.

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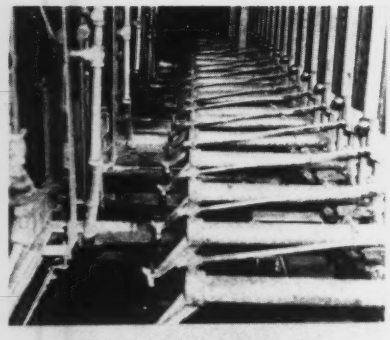
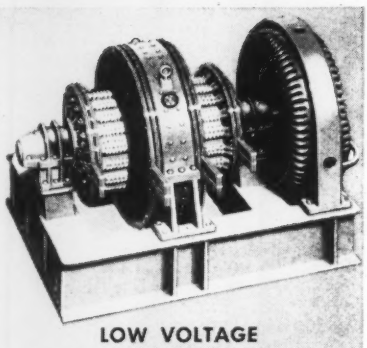
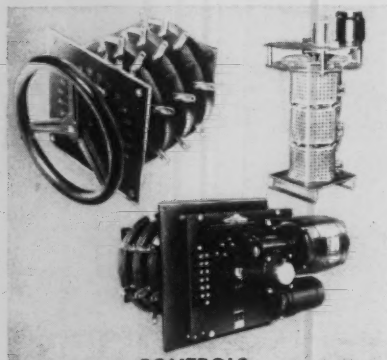
GERMANIUM AND SELENIUM RECTIFIERS



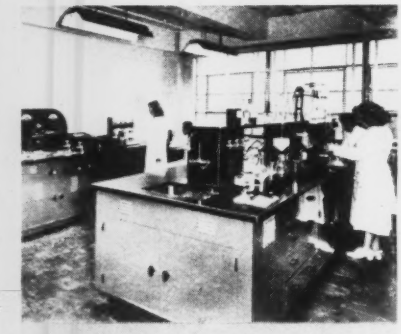
PROCESSING EQUIPMENT



LOW VOLTAGE GENERATORS



CONTROLS



LAB AND FIELD SERVICE

FINISHING SUPPLIES

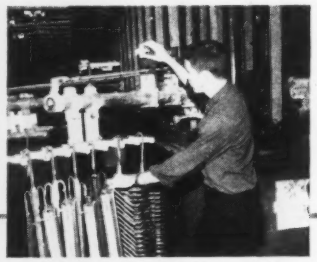
EVERYTHING FOR ANODIZING

H-VW-M is your *one source* for supplies, equipment – and the best service anywhere!

Whether you're setting up a new aluminum finishing shop, or enlarging or modifying existing facilities, you can fill *all* your needs at H-VW-M. That's because H-VW-M is the one company combining a complete engineering service with a full line of equipment and supplies for modern aluminum finishing.

Here's an idea of what you can get, anytime, from H-VW-M:

- **ELECTRICAL EQUIPMENT** – a full line of both Germanium and Selenium rectifiers, in all voltage ratings, remote and self contained models, with a wide choice of controls – or a wide range of low voltage generators.
- **STILL TANK OR FULL AUTOMATIC EQUIPMENT** – whatever you need, from a single component to a complete, integrated system.
- **ALUMINUM FINISHING SUPPLIES** – new compounds, improved cleaners, and H-VW-M "*Job-Tailored*" Buffs, to give you top economy in every finishing step.
- **ENGINEERING SERVICE AND INSTALLATION**—*one responsibility*, all the way. H-VW-M engineers and technicians are specialists in anodizing equipment, with years of experience behind them.



"DIAL-A-CYCLE" MEANS *AUTOMATED ANODIZING* – set the dial, and the H-VW-M automatic conveyor does the rest! One operator can anodize or electroplate a number of different parts, each requiring its own special finish, treatment, or color. Carrier follows dial setting, lowers parts into right tank for right period, bypasses others—automatically. Save on production time, labor, capital investment.

For all information, write to Hanson-Van Winkle-Munning Company, Matawan, New Jersey. Offices in principal cities.

H-VW-M

PLATEMANSHIP—Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing – of a complete equipment, process and supply line for every need.

4761

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

(*Concluded from Page 71*)

ciates, Detroit, has been appointed representative of the division in Michigan, Indiana, and northern Ohio.

Davis Keyseater Co.

Following the purchase of the plant and equipment of Davis Keyseater Co., Rochester, N. Y., by Morley Machinery Corp., Buffalo, the Davis firm has become a division of Hansford Mfg. Corp., Rochester, N. Y. Morley Machinery is allied with Hansford: Morley Machinery is the manufacturing entity; Hansford, the sales and distribution organization. Davis Keyseater will continue to be operated under its own name.

Ellicott Unit Renamed

Novelty Steam Boiler Works Inc., a subsidiary of Ellicott Machine Corp., Baltimore, has been renamed Ellicott Fabricators Inc. The subsidiary makes pressure vessels and special metal fabrications. Allan W. Mund is president.

Buys Marine Line

Temco Machine Works Inc., Baltimore, manufacturer of marine specialty equipment, acquired the patent rights of the J. A. Zurn Mfg. Co., Erie, Pa., to produce its line of marine specialties. Production has been started on such items as scupper and bilge relief valves, vents, and drains.

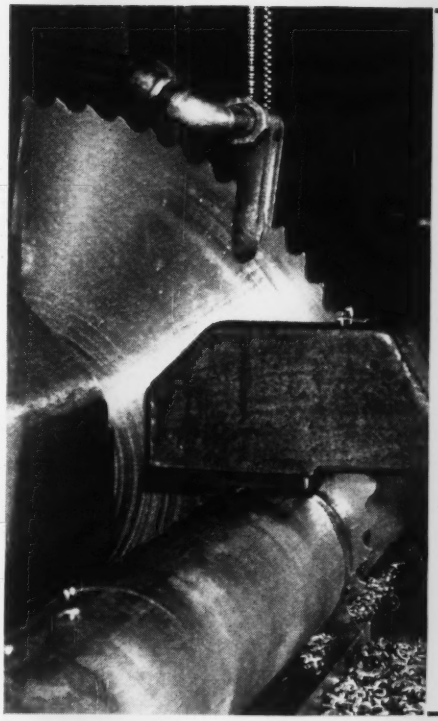
Plans Fabricating Plant

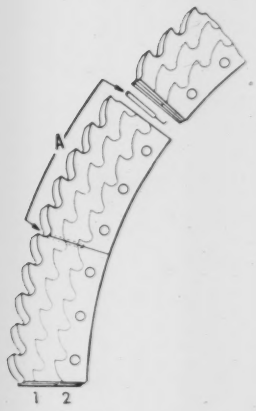
A steel fabricating plant may be erected in Saltfleet Township, Ont., by two Dutch industrialists, J. D. Bakker and G. Griffenon, formerly of Johannesburg, South Africa. The firm plans also to engage in structural steel construction, specializing in erection of sheet steel buildings.

American Steel Expands

American Steel Inc., Baltimore, manufacturer of steel joists, is constructing a 12,000 sq ft plant in Havre de Grace, Md. An additional 6000 sq ft will be undercrane runway. Equipment from the present plant will be transferred

(*Please turn to Page 78*)





Exclusive patented pin-lock feature provides permanent and perfect alignment. Aligning pins lock segments together. Eliminate aligning rivets of conventional saws which limit sharpening. With rivets, saws can be sharpened only to line 1. With pins, you can sharpen Disston Segmental Saws to line 2—adding 30% to cutting life.

30% LONGER CUTTING LIFE with a DISSTON SEGMENTAL SAW!

for ferrous and non-ferrous metals

REDUCE YOUR REPLACEMENT COSTS! Each segment has up to 30% extra life, because sharpening is not limited by conventional aligning rivets. Tough-bodied Disston Segmental Saws—of alloy steel—take the strains and shocks of production cutting with less wear.

REDUCE YOUR SHARPENING COSTS! You can sharpen the Disston high-speed steel tooth segments on automatic machines. Teeth are accurately indexed. Actually, Disston segments need sharpening infrequently. And—narrow kerf provides fast, clean cutting with a minimum of waste.

FAST, PROMPT DELIVERY! Large stocks make certain that Disston Segmental Saws report to work in a hurry. Stocks are carried for all popular cold cutting machines. In stock are diameters ranging from 11″ to 38″.

Diameters up to 63″ are available. You can have a Disston Segmental Saw bored to your specifications.

Disston Division, H. K. Porter Company, Inc., Philadelphia 35, Pa.

H. K. PORTER COMPANY, INC.

DISSTON DIVISION

Totally

YOURS
from the case of the
A. O. Smith motor man

TOTALLY ENCLOSED AND EXPLOSION-PROOF MOTORS
Polyphase with explosion-proof models available in Underwriters Class I and Class II construction. Available in all frame sizes—182 and up.

. . . plus these and other types
to comprise *the nation's 3rd full motor line*

Enclosed Motors
1/3 to 500 hp

Dressed to kill your motor application and maintenance problems

From A. O. Smith — a complete line of totally enclosed motors ⅓ to 500 hp — that cost a little more than open motors, but offer a big bonus in trouble-free performance. Electrical design based on —

- Ample torque to assure dependable operation through overloads or voltage drop.
- Balanced insulation to afford maximum protection against phase-to-phase or phase-to-ground breakdowns during high amp surges.
- Dependable heat dissipation to avoid burnouts even when the motor is covered by dirt and grease.

What's more, these motors are built with precision-machined rolled steel or heavy cast iron frames that completely enclose all electrical parts and bearings . . . resist mechanical shock and abuse . . . fight off corrosion, toxic vapors and dust . . . are easy to clean . . . and provide for permanent alignment of moving parts and lengthened bearing life.

They're readily available from stock . . . will be supplied along with all the engineering and application assistance you want or need. And you get 24-hour response on parts or service from any of the 300-plus authorized A. O. Smith motor service stations.

Get the complete story from your A. O. Smith Motor Man or write direct for his name.

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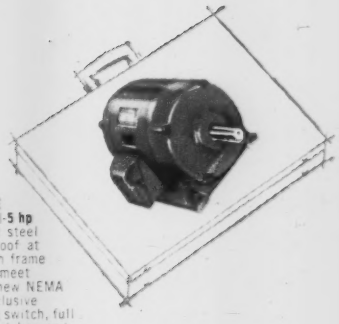
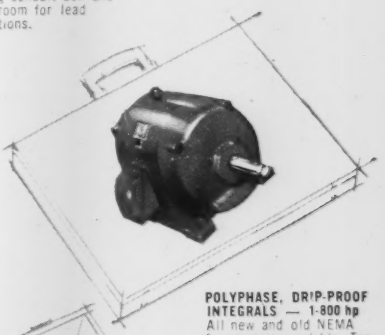
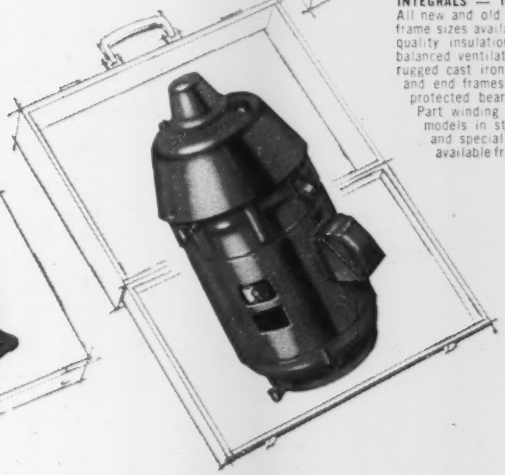


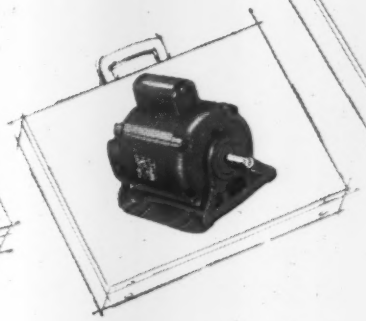
SINGLE-PHASE INTEGRALS—1-5 hp — with rolled steel frame. Drip proof at all angles with frame mountings to meet both old and new NEMA standards. Exclusive sealed starting switch, full rotating conduit box and ample room for lead connections.



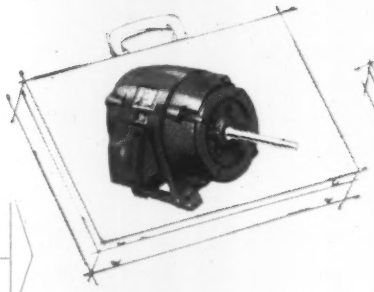
POLYPHASE, DRIP-PROOF INTEGRALS — 1-800 hp All new and old NEMA frame sizes available. Top quality insulation, dual balanced ventilation, rugged cast iron main and end frames, doubly protected bearings. Part winding start models in standard and special voltages available from stock.



VERTICAL HOLLOW SHAFT MOTORS — 1-700 hp — Sturdily built, totally enclosed, weather-proof and explosion-proof motors. Feature heavy cast iron construction, extra-high downthrust suitable for momentary up thrust conditions, sealed bearing chamber, easy access for inspection or service. Available with interchangeable P and PH bases.



FRACTIONALS — ⅓ — 1 hp — Rigid or resilient base, capacitor start or polyphase induction motors. Choose from horizontal or vertical, single-phase or polyphase models. Single-phase 115-230 volts — polyphase 208-220/440-550 volts. Over 1,000 standard models to choose from.



CLOSE-COUPLED PUMP MOTORS — 1-75 hp — Drip-proof, totally enclosed and explosion-proof motors specifically designed for all types of centrifugal pumps. New and old NEMA frames available . . . easily made to operate on non-standard power sources.

A sign of efficiency

for every type of building

Wherever you see Kinnear Rolling Doors, you can be sure there's a high level of efficiency in handling plant traffic — plus other important advantages.

The coiling upward action of the *Kinnear-originated* interlocking steel-slat door curtain makes all space around the door fully usable all the time.

Kinnear Motor Operators add quick, easy, push-button control to this efficiency. They permit you to control any number of doors from a single point, or each door from any number of points.

This cuts traffic delays and bottlenecks and promotes *prompt* door closure, reducing loss of heated air in winter, cooled air in summer.

In addition, Kinnear Rolling Doors assure extra all-steel protection against wind, weather, fire, intrusion and vandalism.

You can't beat Kinnear's 60-year record for providing long, low-cost, dependable door service under hardest daily use. Kinnear Rolling Doors — built to fit any opening — are easily installed in old or new buildings.

Write today for catalog or recommendations.

KINNEAR
ROLLING DOORS
Saving Ways in Doorways

Heavily Galvanized! 1.25 oz. of pure zinc per sq. ft. of metal (ASTM Standards) gives Kinnear Rolling Doors **lasting** protection from the elements. Special Kinnear Paint Bond permits paint to be applied immediately after doors are erected, assuring thorough coverage and lasting adhesion.

The KINNEAR Mfg. Co.
Offices and Agents in All Principal Cities

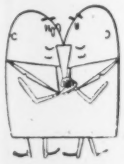
FACTORIES: 1780-1800 Fields Ave., Columbus 16, Ohio; 1742 Yosemite Ave., San Francisco 24, Calif.

(*Concluded from Page 75*)

to the new one and additional machinery will be purchased. The company's sales office will remain at 12 E. 24th St., Baltimore, Md. J. G. Yowell is president.

National Wire Expanding

In April, National Wire Products Corp. will complete construction of a 50,000 sq ft building near its present plant in Baltimore. Also near completion is a 10,000 sq ft branch plant at Tampa, Fla. The firm makes welded and wire mesh for the building trade.



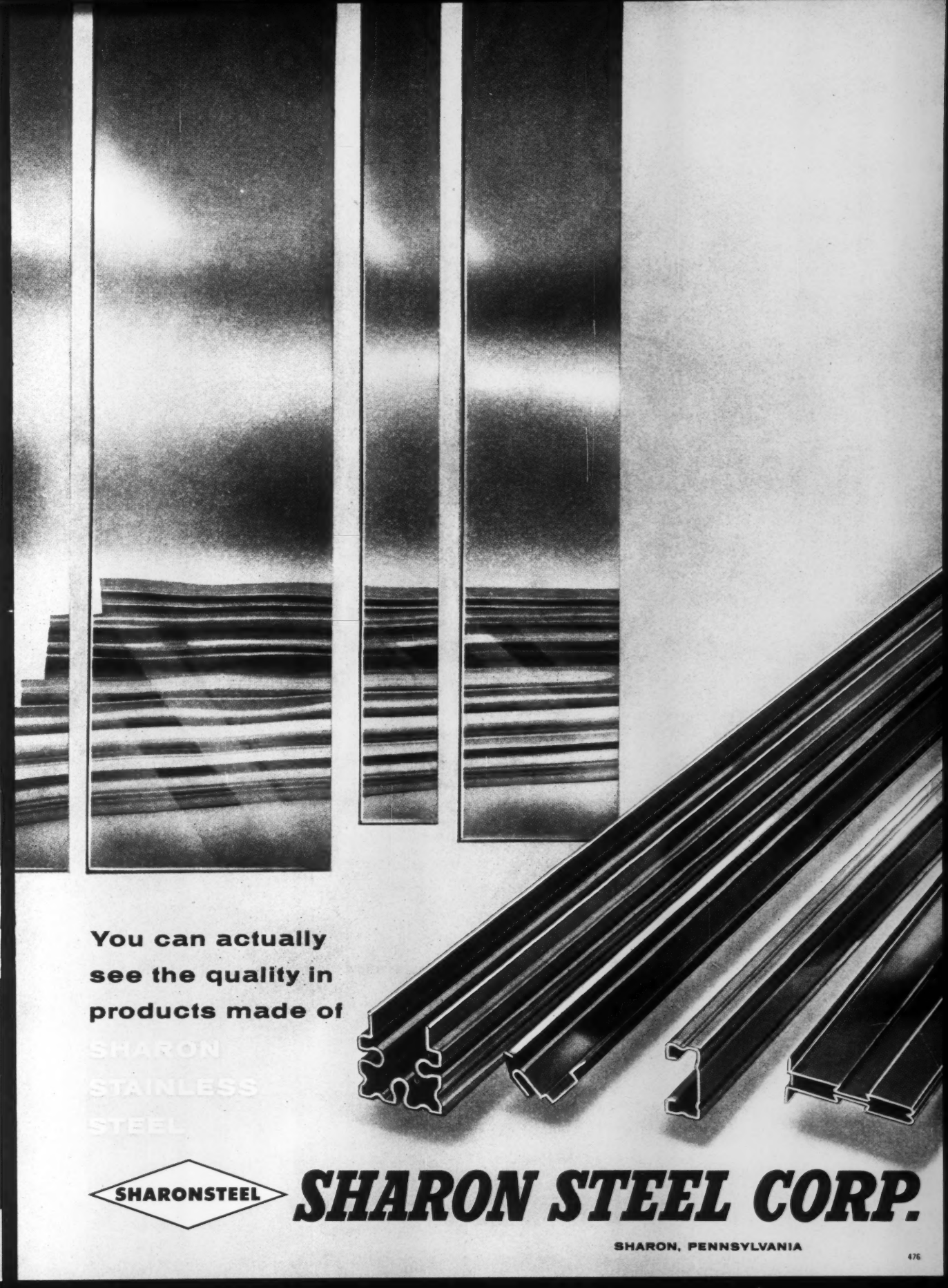
CONSOLIDATIONS

Barry Controls Inc., Watertown, Mass., acquired the physical assets and products of **Vlier Engineering Inc.**, Los Angeles, and will operate the property as a wholly owned subsidiary, Vlier Engineering Corp. Vlier makes special tooling accessories for dies, jigs, and fixtures.

Hein-Werner Corp., Waukesha, Wis., purchased **Fox River Mfg. Co.**, Oshkosh, Wis., producer of marine controls and equipment, and will operate it as a subsidiary.

Koehring Co.'s British affiliate, **Newton Chambers & Co. Ltd.**, Sheffield, England, plans to merge with **Ransomes & Rapier Ltd.**, subject to approval of the stockholders. Newton Chambers is licensed to manufacture Koehring excavators and other equipment for the sterling trade areas. The parent company, **Koehring Co.**, Milwaukee, has acquired **Clark's Welding Works**, Perkins, Calif., custom manufacturer of specialized construction equipment and concrete batching plants.

Lindsay Chemical Co., Chicago, will be merged into **American Potash & Chemical Corp.**, Los Angeles, subject to approval by shareholders. Lindsay Chemical would be operated as the Lindsay Chemical Div. of American Potash. American Potash and its subsidiaries make more than 60 products, including boron compounds; lithium, rubidium, and cesium chemicals; manganese dioxide; chlorates; bro-



You can actually see the quality in products made of SHARON STAINLESS STEEL

SHARONSTEEL

SHARON STEEL CORP.

SHARON, PENNSYLVANIA

476

Let us demonstrate — right in your plant or shop — how 'Budgit' Hoists can make your lifting problems disappear.

Free Demonstration

IN YOUR PLANT OR SHOP

Make us prove how 'Budgit' Hoist can solve YOUR lifting problem

Your local 'Budgit' Electric Hoist distributor now makes you this special offer:

You pick the spot where you need help in lifting.

Call your 'Budgit' Hoist distributor. (You'll find him listed in the yellow pages under 'Budgit'.)

He'll bring a 'Budgit' Hoist to the spot you name, hang it up, plug it in, and show you how 'Budgit' can make your lifting job fast, safe and effortless.

No obligation. Demonstration takes only minutes. All you need is a place to hang the Hoist and an electrical outlet (or 12-volt battery).

HANDLES ANY LOAD

The 'Budgit' Electric Hoist can handle any kind of load up to 2 tons: machinery units, castings, crates, dies, pipe . . . anything. Works indoors or out. Has two automatic brakes for extra safety. Either alone can hold the load.

One-hand control leaves your other hand free to guide the load. Hairline stops and starts let you "spot" your load gently within 1/100th of an inch.

AC and DC models. Also 12-volt battery models for use on trucks. Prices start at $159.

Call your Shaw-Box distributor today or write for your copy of Bulletin 402 and 404. No obligation of course.

58A-2

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

'Budgit'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

386 **West Broadway • Muskegon, Michigan**

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

mine; potash and soda ash; insecticides; fumigants; and refrigerants. Lindsay is a producer of thorium, cerium, and rare earth chemicals.

National Electric Products Corp., Pittsburgh, plans to acquire **Frequency Standards Inc.**, Asbury Park, N. J., maker of electronic apparatus and instruments.

ASSOCIATIONS

Ward F. Simmons has been appointed chief of the High-Temperature Metals Research Div., **Battelle Memorial Institute**, Columbus, Ohio. Much of Mr. Simmons' research has been on the high-temperature properties of the newer metals such as titanium, zirconium, beryllium, and their alloys.

NEW OFFICES

Sylvania-Corning Nuclear Corp., Bayside, N. Y., opened a sales office at 1811 Adrian Rd., Burlingame, Calif. J. O. Vadeboncoeur has been named marketing manager of the western region.

Yale & Towne Mfg. Co., Philadelphia, established a factory branch at 6055 Fairmount Extension, San Diego, Calif., for the sale and service of industrial lift trucks. It is under the direction of J. B. Cunningham.

NEW PLANTS

R-S Furnace Co., Philadelphia, will soon move to its plant at North Wales, Pa. It is three times larger than present facilities. The firm makes metal treating furnaces.

Penco Metal Products Div., Alan Wood Steel Co., Conshohocken, Pa., is now in its new $2.5-million plant at Oaks, Pa.

A $4-million precision casting plant has been completed by Wigton-Abbott Corp. for **Microcast Div.** of **Austenal Inc.** at La Porte, Ind.

Alter Co. and **Alloy Metal Products Inc.** have completed construction of their scrap processing facilities at Davenport, Iowa. Alter's plant has a scrap baling press that can reduce three automobiles to a 60 by 24 in. bundle in 90 seconds. The plant also uses shears and flame cutters for the preparation of other types of scrap. The secondary nickel plant of Alloy Metal Products has facilities to process scrap and produce alloys.

Convair (Astronautics) Div., General Dynamics Corp., San Diego, Calif., is moving into its $40-million plant at Montgomery Field, that city. The division is pilot producing the Atlas ICBM. Convair invested about $20 million in the 252-acre plant site and six primary and nine auxiliary buildings. The Air Force is installing $20 million worth of machine tools and other heavy equipment.

Microtech Co., a subsidiary of Federal-Mogul-Bower Bearings Inc., Detroit, is building a $500,000 plant at 1201 Arden Dr., El Monte, Calif. It will provide ten times more manufacturing capacity than the present facility at Pasadena, Calif. The plant will turn out high precision miniature ball bearings.

Wallace Barnes Co. Ltd., Hamilton, Ont., has opened its branch plant in the Pointe Claire industrial district of Montreal, Que. The company, a subsidiary of Associated Spring Corp., Bristol, Conn., makes precision mechanical springs. Alfred W. Bentley is plant superintendent.

NEW ADDRESSES

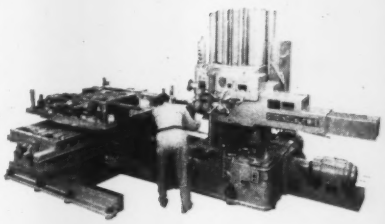
Wellmade Metal Products Co. moved to 860 81st Ave., Oakland 21, Calif.

Babcock & Wilcox Co.'s Boiler Div. moved its district sales office to the Illuminating Bldg., 55 Public Square, Cleveland 13, Ohio. S. T. Mackenzie is vice president in charge of sales for the division.

Walworth Co. moved its executive offices to 750 Third Ave., New York 17, N. Y. The firm makes valves and pipe fittings.

TENNESSEE — South's Largest Concentration of TOOL and DIE SHOPS for Metal Working Industries

These excellent tool and die facilities make Tennessee an advantageous location for branch plants. Ranging from medium size to firms employing 40 to 100 men, many of these shops can take care of virtually any assignment from building special machines to complete tooling programs including tools, dies, jigs and fixtures, and are handling important projects for large national manufacturers. If you are considering a branch plant in the South, write confidentially for complete information.



For Details, Write:

TENNESSEE
INDUSTRIAL & AGRICULTURAL
DEVELOPMENT COMMISSION
S-12 Cordell Hull Building
Nashville 3, Tennessee

Please send details on Tennessee's tool and die industry and other industrial advantages.

Name_____

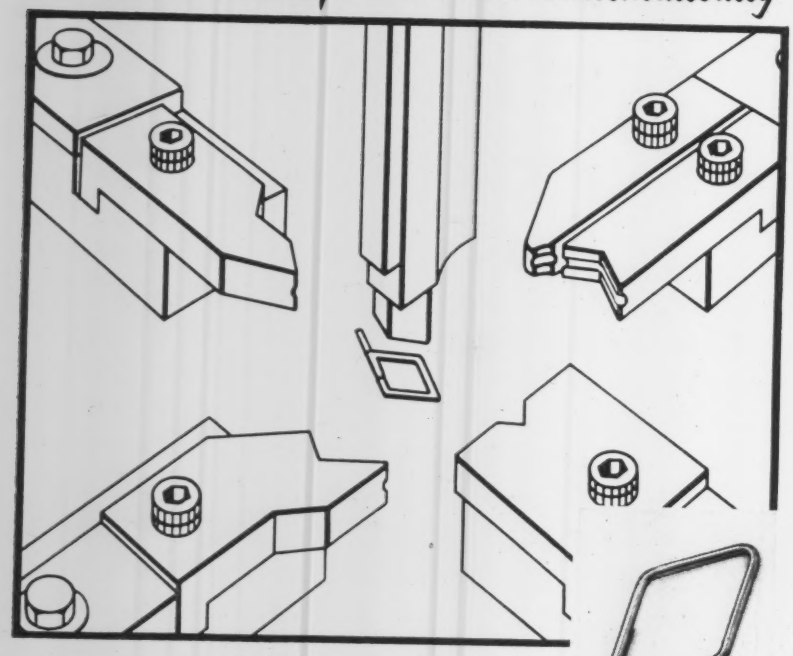
Firm_____

Address_____

City_____ State_____

NILSON 4-SLIDES

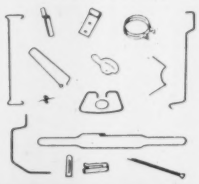
FORMING PRODUCTION PROFITS... *Automatically*



16,000 PARTS PER HOUR on a NILSON *Automatic* 4-SLIDE

PRODUCT: Deadlock Hook
MATERIAL: Soft Basic Wire
PRODUCTION: 280 Pieces Per Minute
MACHINE: No. S-0 Nilson 4-Slide

SIZE RANGES
Wire up to ½" diameter
Ribbon stock to 3½" wide
Feeds up to 32"
5 TO 75 TON PRESS SECTIONS



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Coming Apr. 14

Managing Defense Work for Profit

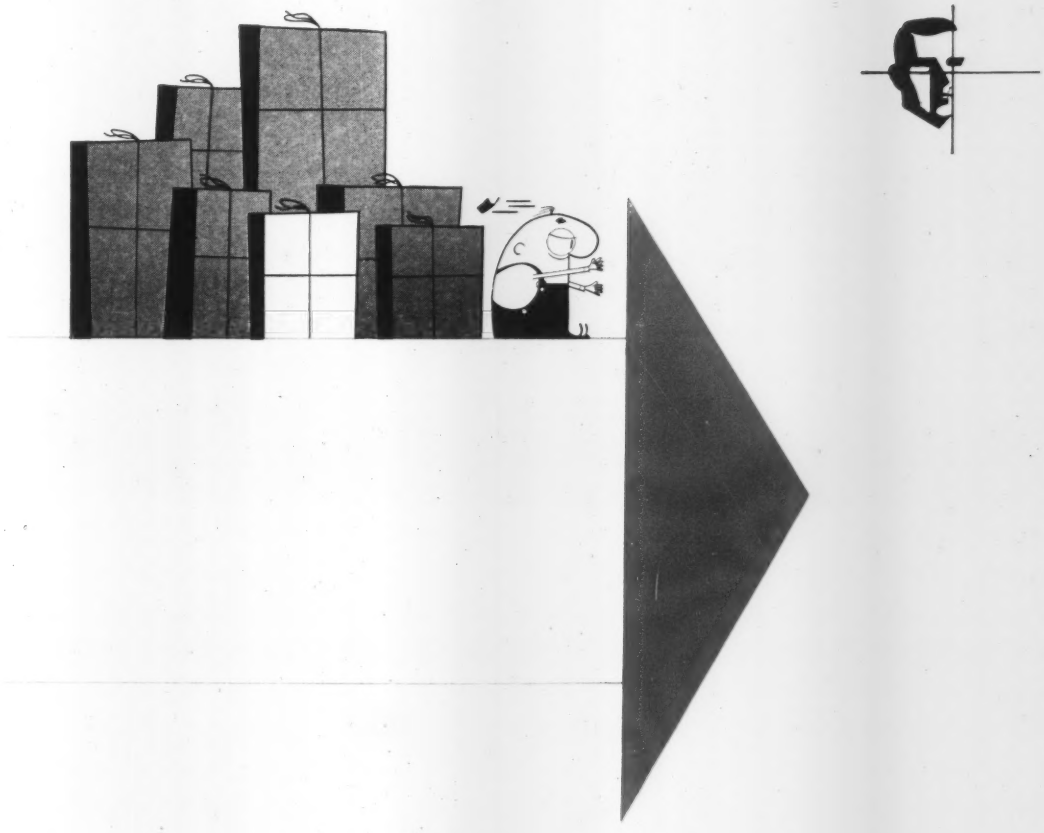
Defense spending is rising moderately. We're switching to missiles. And the Pentagon has adopted the weapon system concept of procurement. All three developments mean it's time to reappraise profit possibilities in defense business.

The long term potential is there, but in the switch to "birds," much research and development is necessary. In doing such work, companies can't realize good profits immediately. But they can plant the grass roots for healthy profit growth. The next article in STEEL's Program for Management will show how.

Articles published to date:

1. **Balancing Management for Profit (Feb. 17, Page 113)**
2. **Production Control for Profits (Mar. 17, Page 83)**

Extra personal copies of these Program for Management articles are available until the supply is exhausted. Write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



Production Control for Profits

THE MANAGER reasoned that his division's unit manufacturing costs were lowest when it produced in large lots. A major cost in operating automatic equipment was setup time. The master schedule sent to his production control department looked airtight.

But it didn't take long for all hell to break loose. About the time one product was coming off the line, a salesman brought in a rush order for another product that wasn't scheduled to go into production for another three months.

The incident has a message for metalworking managers on the lookout for ways to trim fat from their operations: Production control can be a razor sharp, cost cutting tool—if you include the customer in your plans. Exclude him and you have a blunt instrument that wouldn't put a dent in hot butter.

The best production control system is useless if the product isn't ready when the customer wants it. The in-between steps you must take before you can hit the bull's-eye require a lot of hard planning and doing.

Ladder to Success

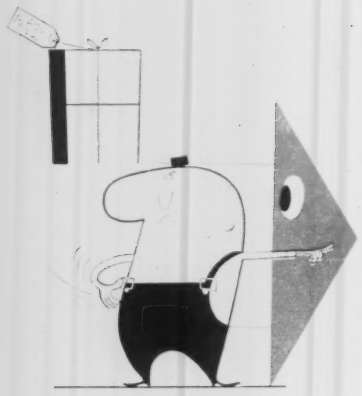
Here's a quick rundown of the ingredients that go into an effective production control program.

A master plan, the rudder that sets the course for the company's progress, is developed by top management. It encompasses present operations and changes that are in the works, such as plans to expand or diversify. Management

What Production Control Can Do . . .

It is a management tool. Used correctly, it should enable you to:

1. **Meet requested delivery dates.**
   . . . satisfy customers and lead to more orders.
2. **Use labor and machine capacity efficiently.**
   . . . level production activities, eliminate costly peaks and valleys in the volume of work.
3. **Maintain optimum inventories of raw materials, work in process, and finished goods.**
   . . . minimize material shortages without tying up working capital in excessive inventories.
4. **Foresee production bottlenecks in time to avoid them.**
   . . . reduce overtime on rush orders.
5. **Decrease idle time of men and machines.**
   . . . reduce number of times employees have to wait for tools or materials before starting the next job.
6. **Assure an orderly flow of materials through the shop.**
   . . . keep work in process from accumulating on the shop floor while waiting for the next operation.
7. **Carefully plan material procurement from outside venders.**
   . . . avoid errors and rush orders.
8. **Meet production goals in an orderly manner.**
   . . . maintain personal satisfaction and high morale of employees—an important part of being a progressive organization.
9. **Help shop foremen solve production scheduling problems.**
   . . . furnish records, reports, and other clerical services.



also establishes definite organizational policies and lines of authority.

Implementation requires these steps:

1. Responsibility is assigned for the materials and equipment to be used in manufacturing.
2. Manpower requirements are determined.
3. Standards of product design, specifications, and operating procedures are written.
4. Machines and equipment are analyzed to set up standards of operation.
5. Performance ratings are made for all manufacturing processes.
6. Records of operator and machine performance are maintained to check performance standards.
7. Communication lines are set up. (Each phase of production control serves a specific function. Many systems fail because the diverse groups do not keep each other informed through adequate records and reports.)

The day-to-day job involves four activities: Scheduling, material control, dispatching, and follow-up.

Scheduling

The sales forecast is the starting point for the planning and scheduling group. The forecast always includes an analysis of sales histories to pinpoint demand patterns, an analysis of order backlogs, and an interpretation of statistical information in terms of general business conditions.

How It's Used—In mass-production work, daily, weekly, and monthly production figures are based directly on forecasted demand.

In contract manufacturing, customer orders are the basis of production scheduling. But forecasts are still necessary to assure the availability of machines, personnel, raw materials, and other essentials.

The majority of metalworking plants do a mixture of mass production and contract manufacturing.

Case History—Lamson & Sessions Co., Cleveland, makes fasteners for the hardware trade, the auto industry, and for consumer equipment. Here's the kind of knowhow that goes into its scheduling.

The auto industry considers its suppliers as its warehouse. A supplier must carry enough stock to meet anticipated orders. It takes good forecasting and a thorough knowledge of a customer's business to know how much inventory to stock. Model changes and contract cancellations can be costly if inventory is too large.

Production of fasteners for the hardware trade is worked against the inventory on hand. Again, the

inventory will vary with business conditions. Demand is generally steady. Production can be geared to economic quantities.

Fasteners for consumer equipment generally are made to customer order. They are sometimes produced for stock against estimated use by the industry. Again, forecasting is necessary.

L&S Plan—To keep a balanced load in its plant, Lamson & Sessions reserves production time for each class of product. This creates flexibility in scheduling and allows adjustments as overloads show up and anticipated orders fail to materialize.

E. H. Werner, the firm's production manager, puts the problem this way: Because the supplier acts as a warehouse for many industries, he must watch his customer's business carefully. Bolts and nuts are a high volume, highly competitive business. You have to give the customer what he wants when he wants it or he'll go elsewhere.

Typical Scheduling — In industries which make a single product continuously, scheduling can be done over long periods. It will remain unchanged until the introduction of a new model, or some drastic reduction or increase in production is necessary.

In intermittent manufacturing (a combination of mass production and contract work), scheduling periods are short. The small job shop may confine scheduling to the work in sight.

For most metalworking companies, a 90-day schedule is common. The first 30 days are usually frozen; the next 60 days are tentative to allow for adjustments.

The director of production planning at a midwestern steel company puts it this way: The sales forecast is useful to a production man on a 60-day level only. One month is always firm. The next is left flexible to boost or cut back production as trends progress. "We only take a look at the forecast for the third month."

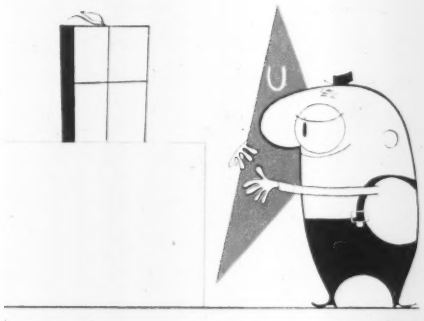
Over-All Targets—The primary objective of your scheduling group is to insure delivery of finished goods or completed units to customers at the right time and in the right quantities. It must determine starting times for each operation and fit them into the plant's workload.

A second objective is to insure that all fabricated and purchased items for a particular product will be available when they are needed for the start of the assembly operation. This job requires good com-

How Production Control Is Built . . .

Successful systems are built on a thorough knowledge of the manufacturing process. Here are five essential ingredients:

1. **The master schedule. To make it work, you must know:**
   a. Capacity of the plant by department or machine center.
   b. Capacity requirements for each job.
   c. Priority of each job.
2. **Plan of work. It takes a knowledge of:**
   a. Steps in the process—what is to be done and how.
   b. Estimated time for each step.
   c. Materials and equipment to be used.
   d. Capacity of equipment and personnel.
3. **Production schedule. To plan it, you must have records of:**
   a. Available machine capacity.
   b. Jobs in process, their priority, and progress.
   c. Availability of materials.
4. **Orderly dispatching. To do his job well, the dispatcher must:**
   a. Have forms from the scheduling department that show what is to be done, where, when, with what, and by whom.
   b. Know the manufacturing operations so he can co-ordinate them by issuing orders.
   c. Issue orders as close as possible to the work time for each operation.
   d. Get back work reports quickly so necessary corrective action can be taken.
5. **Progress records. They must be maintained so that:**
   a. Corrective action can be taken quickly.
   b. Costs can be determined and compared with estimates for pricing.
   c. Future cost estimates and work plans can be accurately made.



Planning for Economic Runs . . .

One of the problems of master planning is balancing manufacturing and inventory costs. Longer production runs and fewer setups decrease manufacturing costs, but they increase inventory costs and heighten the possibility that finished products will become obsolete before they're shipped. The problem is to find the point where the sum of the two costs is at the lowest level (see chart).

Cleveland Graphite Bronze Co., Cleveland, has worked out a formula for economic lot runs. In one year, it has substantially reduced manufacturing costs on many jobs. The difficulty is arriving at cost figures that make the formula work. Here are the necessary steps, explains Peter W. Smith, head of raw material control:

1. Forecast customer requirements. It's the basis of all planning; there is no magic way to eliminate the need for serious thinking about the forecast.

2. Evaluate manufacturing costs. These should be out-of-pocket costs only (labor and material, not overhead).

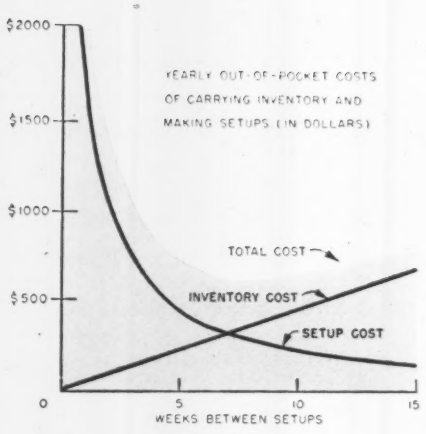
3. Evaluate inventory costs. Again, these should be only out-of-pocket costs (warehousing, insurance, taxes, cost of money tied up in inventory, obsolescence).

To assure a satisfactory transition to the economic lot run, follow these steps:

1. Start with high volume parts. Runs are regular, and adjustments up or down are easily made. This approach allows you to realize significant savings and establish a sound basis for evaluating the system.

2. Ease the system into your production. Extend it to smaller volume parts until the sales potential becomes so small it precludes repetitive lots.

3. Review the economic lot structure constantly. It will have to be revised as changes are made in long range forecasts, routings, and other factors.



$$T = \sqrt{\frac{2}{R} \cdot \frac{C_3}{C_1} \cdot \frac{1}{1 - \frac{R}{K}}}$$

T = OPTIMUM RUN SIZE IN WEEKS

C_1 = COST OF CARRYING 1000 PIECES FOR ONE WEEK

C_3 = COST OF ONE SETUP

R = LONG TERM FORECAST OF CUSTOMER REQUIREMENTS, IN THOUSANDS OF PIECES PER WEEK

K = AVERAGE RATE OF PRODUCTION IN THOUSANDS OF PIECES PER WEEK

munications with material control. (Exhibit on Page 87 tells how Buffalo Forge Co. does it.)

The scheduling group should check inventory balances and machine loadings to watch for shortages of parts, machines, or manpower.

Another important contribution that management has the right to expect from this group is the balancing of the over-all plant machine load to gain maximum productivity at lowest cost.

Proper machine loading avoids the overloading of busy equipment, provides a reliable basis for scheduling, and makes for maximum utilization of labor and equipment. Basic data must be assembled to show the periods during which shop equipment was assigned to scheduled orders.

Case History—To insure sufficient capacity at all times, Warner & Swasey Co., Cleveland, master schedules its plant load for six-month periods. The work assigned includes an over-run to allow for unscheduled rush orders, equipment breakdown, scrap, and other unexpected delays. Each month, the production schedule is reviewed and modified to maintain its timeliness. Over-runs are knocked out by the end of two months.

Manufacturers of capital equipment have a high percentage of service orders. At Warner & Swasey, replacement parts sometimes reach 25 per cent of the work.

The machine tool builder has about 35 machines in its line. The problem of unexpected orders for service parts is solved by scheduling production of most machines every month or two months. Says George Meyer, general superintendent: "Having most jobs going through no more than 60 days apart allows us to pull service parts out of regular production when needed."

Material Control

After required quantities and types of material are determined

for each order, it's essential to put the bill of materials through control records to find out if they are in inventory. If they aren't, it's up to this group to initiate purchase orders.

Make your material control group responsible for these activities: Analyzing material requirements; purchasing materials; receiving, storing, and issuing of materials; and keeping adequate records on material transaction.

Case History—Buffalo Forge Co. uses its finished goods inventory to determine production starting times. The firm makes about 400 products; all items are stocked against anticipated orders.

Order points are established for each product. When the order point is reached, the planning department reviews incoming orders, adjusts the production rate, and a job order goes out to the shop.

Ways To Save—Material and inventory control is an area in which management is finding it can cut costs. Inventory costs are high. Money is tied up in stock; taxes and insurance are high; warehousing must be paid for; and money is wasted if it goes into the fabrication of a part which is later junked because no customer orders it. This applies to stored finished products or components on the shelf.

Case History—There's another side to the inventory problem. One manufacturer of merchant steel goods says he must maintain an inventory of semifinished steel about 30 per cent above his operating capacity to assure quick delivery.

His production is keyed to customer orders. Sales forecasts are used for inventory lay-in. Having some of everything on hand gives him an edge in filling an order, which is more important to him than the cost of carrying a high inventory.

Dispatching

This group releases manufacturing orders to the shop. It starts the manufacturing departments along the courses charted by the planning group.

Make dispatching responsible for these jobs: Getting material from the storeroom or seeing that work coming from a previous process arrives on time; procuring tools for assigned work in advance of need, and initiating inspection for each job assigned. Movement of work after completion of one operation is another dispatching function. Accumulation of work on the shop floor may be due to poor dispatching.

The keeping of records is one of this group's most valuable functions. The information covers such things as: The time and completion of each operation, the completion of each job, spoilage or defective work (dispatching should initiate steps to replace it), idle time of workmen or equipment, reasons for failure to maintain schedules, and a summary of active and inactive loads.

Planning and scheduling depend on such records to guide them on future work. They reflect the ef-

Bring Material Control in Early . . .

Buffalo Forge Co., Buffalo, integrated its production and material control departments to eliminate delays in assembly caused by shortages of material and to eliminate all requisition writing by production clerks or shop foremen.

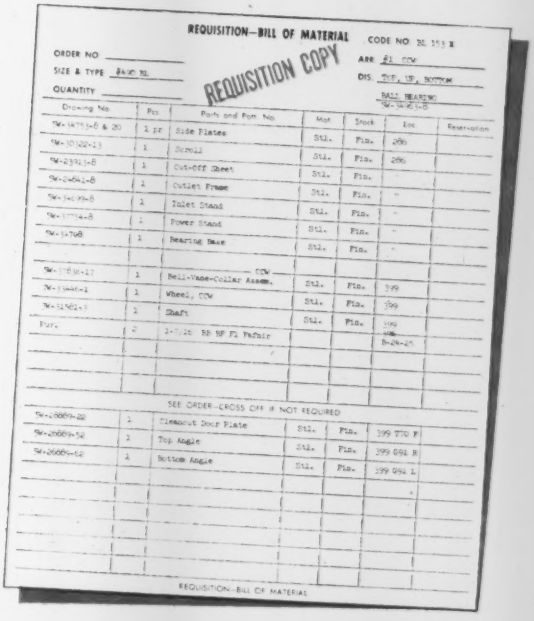
"We have found there is no alternative to making certain that parts are available at the time we receive an order," explains George P. Schivley, director of manufacturing.

On receipt of an order, the production clerk selects three copies of the proper prewritten bill of materials, stamps them "Requisition Copy," "Erection Copy," and "Production Copy." He fills in the order number and the quantity of units required.

The requisition copy is processed through the material control records, and all parts are reserved for the job. If a part is out of stock, it is ordered. Job orders never reach the assembly floor without all parts being available.

The production copy is retained for the production department file. The requisition and erection copies are forwarded to the department which will build the unit. The erection copy is used as authority to start manufacturing; the requisition copy is used to procure the parts from stores.

On the back of the bill of materials is a routing that covers the assembly operations as well as the time standards or piece rates to do the work. The system gets around the additional time an order would have to spend in the routing department.



REQUISITION—BILL OF MATERIAL

ORDER NO. _____ CODE NO. 35 353 X

SIZE & TYPE BASIC 32 ARR. #1 CW

QUANTITY _____ DIS. STR., LR., SCYTHE

REQUISITION COPY

BALL BEARING SW-1A40-5

Drawing No.	Pcs	Parts and Part No.	Mat.	Stock	Loc	Reservation
SW-14775-6 & 20	1 RF	Side Plates	Std.	Fin.	266	
SW-10102-23	1	Bottom	Std.	Fin.	266	
SW-2392-8	1	Cut-Off Sheet	Std.	Fin.		
SW-2494-8	1	Outlet Frame	Std.	Fin.	"	
SW-14079-8	1	Inlet Stand	Std.	Fin.	"	
SW-17714-8	1	Power Stand	Std.	Fin.	"	
SW-14768	1	Bearing Base	Std.	Fin.	"	
		SCW				
SW-17818-27	1	Bell-Vane-Collar Assem.	Std.	Fin.	399	
SW-13440-2	1	Wheel, CCW	Std.	Fin.	399	
SW-15502-1	1	Shaft	Std.	Fin.	399	
Pur.	2	2-7/16 RB NF F1 Pedair			399 B-24-45	
		SEE ORDER—CROSS OFF IF NOT REQUIRED				
SW-26889-22	1	Discharge Door Plate	Std.	Fin.	399 770 F	
SW-26889-52	1	Top Angle	Std.	Fin.	399 092 B	
SW-26889-62	1	Bottom Angle	Std.	Fin.	399 994 L	

REQUISITION—BILL OF MATERIAL

Computers Speed Flow of Information . . .

A large midwestern forge shop uses an IBM 650 computer system for production planning and scheduling, payroll and job cost accounting. The shop gets 100 to 125 orders a day, has an average of about 2400 jobs in process, and handles some 250,000 routings.

Here is how sales orders and jobs in process are handled:

1. Incoming orders are booked on computer tape when received. All pertinent information (including quantity, value, due date) is included.

2. Such things as production center load and allowance for scrap are determined to compute production capacity needed to manufacture the order.

3. Order starting date is computed by putting routing information through the computer backwards—the last operation first—and working back to the first operation.

4. Jobs are scheduled in the shop for a six-month period (long-range schedule).

5. Jobs are scheduled by production center weekly (firm schedule).

6. Progress of work in process is checked daily.

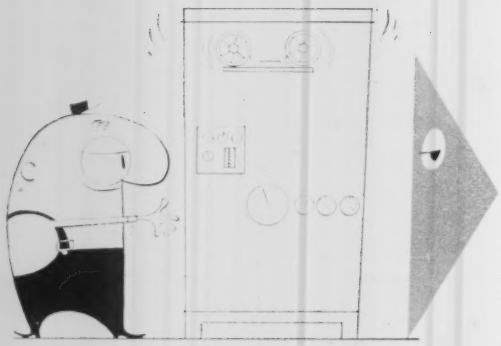
7. Prepunched job tickets are sent to the shop with orders.

8. Completed job tickets are returned. They are used to record variable data after the completion date and check out standards.

9. Firm schedules are updated daily. Anticipated overloads are printed out so the schedule can be rearranged to handle them.

10. Work in process is updated. Jobs behind schedule are pinpointed. Bottlenecks can be foreseen in time to allow for them.

11. Completed job tickets go to people handling bonus payroll and job cost procedures.



fectiveness of the control program and are the guide to improvements.

Follow-Up

The most skillfully organized and maintained production control system is only as good as its follow-up. The ideal system is one of simply checking work progress.

Expediting or "stock chasing" is the mark of inefficiency. You can get an idea of how you're doing by comparing the number of expediters with the number of production control personnel you have.

You'll always need at least one expediter because of: Chances for errors in establishing operating standards and schedules that cannot be met; unexpected delays in procuring raw materials and purchased parts; machine and equipment breakdown; an unusually high rate of rejections from new operations; and complicated engineering changes that affect product design, manufacturing processes, and material requirements.

Someone must always be on the alert to initiate action that will assure the meeting of schedules despite delays.

What an Expediter Does—The job may require a telephone call to a vender requesting a special rush job on a purchase order; it may call for putting special priority on an order for some detail parts so they may progress swiftly through the operations to the assembly line. It may be necessary to reroute an order to a machine that has more available time than the one normally used for the job, or working some of the employees overtime until operations are back on schedule.

Such remedial actions generally result in added costs and reduced efficiency. They should be used sparingly. If it becomes convenient for any employee to deviate from prescribed procedure, the costly and inefficient deviations may become practice.

Follow-up is not solely a matter of handling emergencies. The recording and reporting of production progress is equally important. The records reveal where and when rush orders or overtime may be necessary. They allow you to avoid last minute measures.

Case History — Warner & Swasey Co. has cut its expediter force in half. (See exhibit on Page 89.) After finding that unscheduled rush orders took most of their time, the company expedited its expediters by cutting the number of rush orders.

Eventually, management feels,

the attention given to jobs in process, or pre-expediting, will further reduce the number of people needed to expedite orders that are late.

Record-Keeping Shortcuts

One of the biggest boosts for production control systems has been the mechanization of paperwork. Computers, tabulating equipment, mechanical sorting equipment, and other mechanical aids speed the dissemination of information.

Many benefits stem from the use of mechanical aids. They provide the up-to-the-minute data that are vital to production control. With this information, you know where you are going before you get there. You are forewarned of possible bottlenecks in time to take corrective action.

At any time, you can determine your order backlog for individual equipment or the production center. It means you can quickly compute your total backlog.

Some Tips—Expensive mechanical equipment can save you money if:

1. A great variety of detail parts is included in the finished assemblies.
2. Many parts are common to more than one finished assembly.
3. Parts are produced for stock or in relatively large quantities.
4. Mandatory design changes necessitating changes in material requirements are infrequent.

Computers and tabulating equipment are only as good as the data you feed into them. On the basis of operational and quality standards, they tell you "yes" or "no," but never "maybe."

You get the most help from the machines by constantly checking performance data and analyzing them to revise erroneous standards.

The prime considerations in choosing a computer, tabulating equipment or other mechanical system are the volume of work and the speed required. Computers are the fastest and handle the most work, but they cost the most.

If you think your operation can be improved with the computer system, don't let the cost throw you. The machine can be adapted to so many jobs that you'll end up in the black.

Case History—Cross Co., Detroit, has 550 employees and a $15 million sales capacity. It put a Remington Rand Univac 60 to work in its new special machine tool plant. Management figures savings will come to at least $50,000 a year. (It costs $1000 a month to lease.)

The computer is used to calculate machine loadings, manufacturing costs, progress reports on orders, and the company payroll.

As soon as project gets the engineering release, it is scheduled through the plant by machine center and by the week. Machine loadings are rechecked every week.

The computer also helps to calculate orders that are incomplete. These reports, coupled with regular machine loading studies, give the manager a continuous picture of work progress. He can keep machine centers loaded with the right parts.

Cross is also using the system to compute what it costs to produce an order.

Management feels the computer can handle other jobs. Examples: Screen inventories to match needs against supply, calculate design problems, keep track of unclosed business to help predict sales, analyze lost business to see why it was lost.

Case History—An IBM 650 computer system was installed at a large midwestern forge shop that has about 2400 jobs in process at all times. The system is used primarily for production planning and scheduling—work that was manual. Secondary use, payroll and job cost accounting, was previously done on other data processing equipment.

More Help—You can reap a host of benefits by using mechanized equipment for material control. Many steel producers rely on tabulating equipment to speed the flow of inventory data.

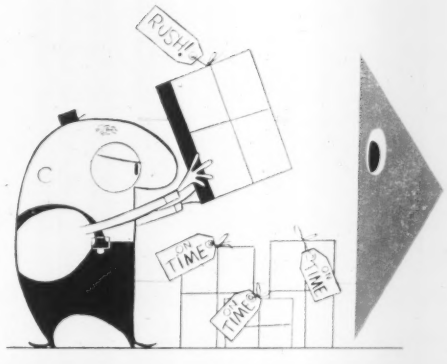
With your inventory on punched

How To Cut "Rush" Orders . . .

Warner & Swasey Co., Cleveland, has two techniques to reduce the number of orders that get behind schedule and become "rush" projects.

1. Leadtime is reduced on the troublesome jobs that are always late—the reverse of what's normally done. By tightening up the schedule, explains George Meyer, general superintendent, you pinpoint trouble spots that might never come to light if you lengthen leadtime.

2. Schedule starting dates by shift, rather than by week. Data processing equipment that calculates starting time gives the answer to one decimal place. The decimal place designates the shift which should start work on the part. Example: A calculated manufacturing time of 6.5 means the part should be started six weeks before due date on the fifth shift of the week. (Warner & Swasey works two shifts a day, five days a week.) Scheduling by shift (even though the due date is by week) allows closer control and assures that parts will arrive at the last operation on time.



How Effective Is Your System?

Evaluate your answers in terms of what is par for your operation.

———— How many master schedule dates and detail schedule dates are you meeting? How many are you missing?

———— What is the dollar value of inventories (raw material, work in process, and finished goods)? What should it be?

———— How many inventory adjustments result from clerical errors or discrepancies?

———— How many rush orders do you have? How many routine orders?

———— Do you have machine and employee idle time even when you have unfilled orders? How much?

———— Check ratios of this type and compare results with those of similar plants: Number of production control people vs. volume of manufactured units; number of production control people vs. number of direct factory labor hours.

cards, information that used to take days and weeks to gather can be obtained on short notice. Running your inventory through on punched cards quickly tells you how much of a certain kind of material you have on hand.

Another innovation: Punch metallurgical information on a card at the time a heat is made. It can accompany the steel through to the finished product.

Case History—Herbrand Div. of Bingham-Herbrand Corp., the Fremont, Ohio, maker of tools and forgings, cut stores inventory 38 per cent by installing a Keysort system. (It's made by McBee Co., Athens, Ohio, a division of Royal McBee Corp.)

Two recording devices did the trick. They provide current information for positive control over all inventory items in the system.

One is a requisition form with marginal code and punching to identify each stock withdrawal and to permit automatic selective sorting for reference.

The other is a collating board for entering data on stock ledger cards and the daily activity journal simultaneously. Eliminated are: Duplicated effort, the possibility of omission, and errors of transcription.

The result is a complete and current record of usage, requirements and stock balances that brings the flow of materials, shortages, and surpluses to the attention of the purchasing agent who is responsible for keeping inventories in line with requirements.

Choosing a System

The type of organization you select for production control should be the one that does the best job at the least expense. If you have complex production problems, some experimenting may be necessary.

Whether all functions of production control are handled by one large central organization or by several smaller ones doesn't make any difference as long as goods are produced at the lowest cost and on schedule.

Pro and Con—Companies with a central organization claim there is less confusion and buck passing because responsibility cannot be dodged.

Critics of the central organization claim that the checks and balances provided by several ambitious leaders of equal rank are assets worth more than the possible extra cost involved.

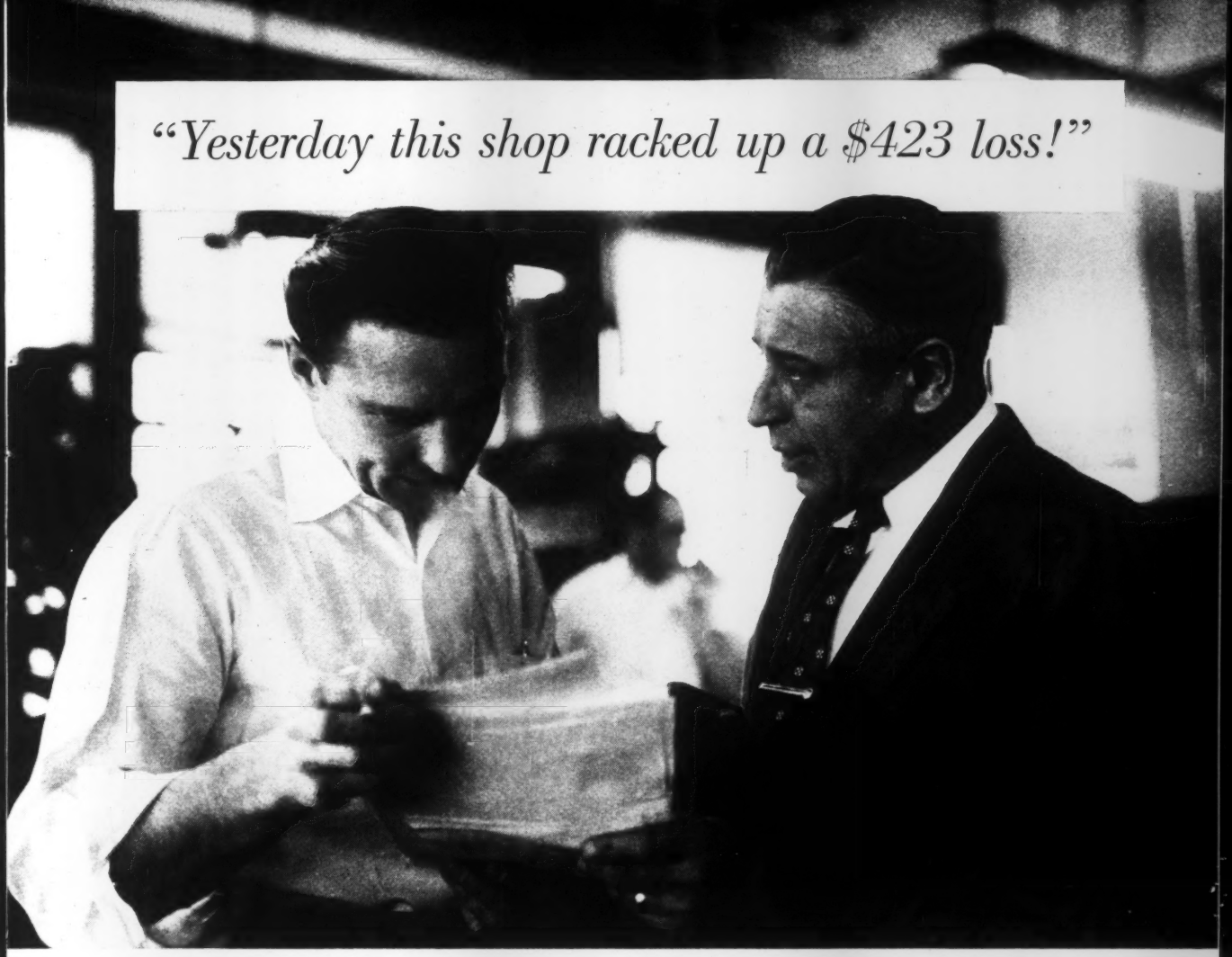
In fully decentralized control, the foreman and superintendent are the centers of responsibility. Each division or department of the plant has its own method of production, subject only to an over-all due date usually set by the sales department.

When the division or department is large, the task of planning and preparing for supervision of production becomes so great that a planning section must be set up. Individual planning sections may develop in each major department with possible confusion arising from the different methods of control.

The Key—The type of manufacturing, not the type of product, is the chief determining factor in setting up a system. The governing feature is the number of parts. A plant that builds six turbines a year, each of which has 20,000 parts, needs an elaborate system. A simple system will handle the requirements of a plant building 10,000 pistons an hour.

Your production control system should be considered as a management tool. It's useful as long as it expedites the manufacture of all products at lowest cost and on schedule. If it isn't doing those things, it's costing you money. Now is the time to replace it.

"Yesterday this shop racked up a $423 loss!"



The foreman's bewildered. How can the plant manager be so sure? Even in a small shop like this one, you don't get *that* kind of information in 24 hours!

The plant manager never thought so, either. Today he knows different. He's got yesterday's down-time figures right in front of him. There's a loss all right. But he knows where – and why. And most important, he knows now that he's equipped to prevent its happening again.

How did the plant manager get such fast, reliable information? With the Keysort Plant Control Plan. Instead of the late or inadequate reports he *used* to get, PCP now gives him an accurate breakdown of each day's labor costs *by the following afternoon*. Keeping abreast of things almost as they happen, he can correct money-losing situations *in time* . . . can keep production flowing on a profitable level.

With just five fast, accurate Keysort PCP reports—1 daily, 2 weekly, 2 monthly—you can obtain complete modern management control of your business and your profits. At remarkably low cost.

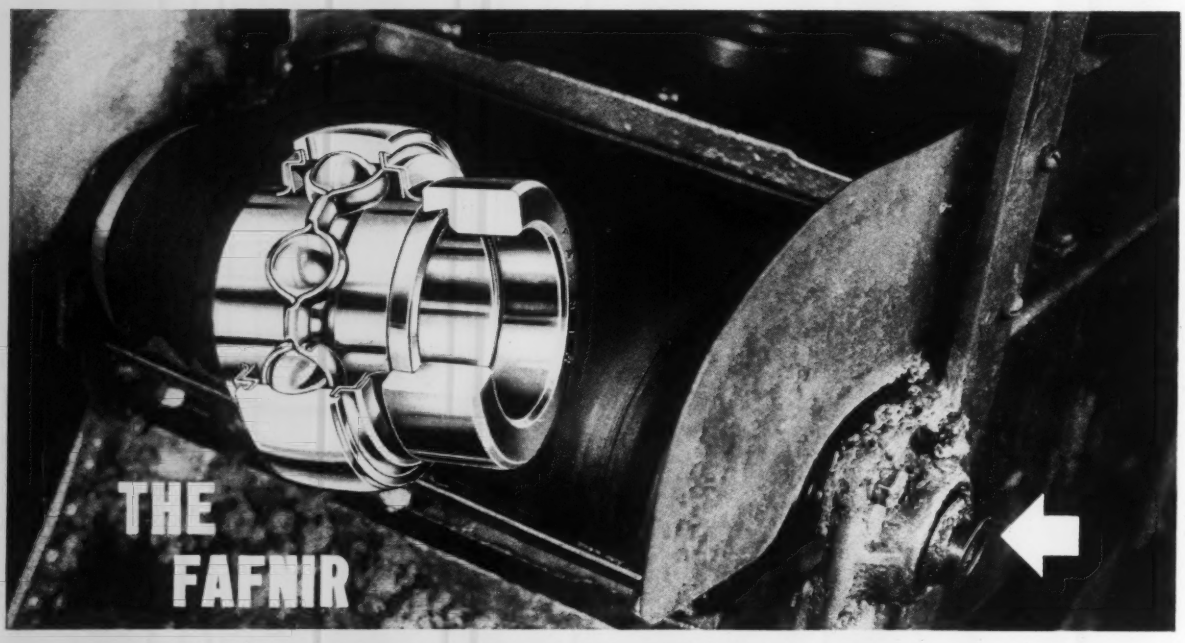
The nearby McBee man has a presentation which will show you how it's done. Phone him, or write us for illustrated folder containing an example of each report.

McBEE KEYSORT®

PUNCHED-CARD CONTROLS FOR ANY BUSINESS

ROYAL McBEE Corporation PORT CHESTER, N. Y., Offices in principal cities. In Canada: The McBee Company, Ltd., Toronto 16

TWO GREAT BEARING DEVELOPMENTS ROLLED INTO ONE!



PLYA-SEAL WIDE INNER RING BALL BEARING

Designed expressly for slow speed applications and wet or dirty operating conditions

New Fafnir Plya-Seal Wide Inner Ring Ball Bearings are a combination of two outstanding bearing developments. The most effective seal ever devised for retention of grease and protection against contamination, plus the famous Fafnir self-locking collar, for cost-cutting, twist-of-the-wrist bearing installation. This combination of features offers you several advantages . . .

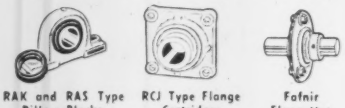
Best protection yet against dirt, dust, steam, water, lint, other contaminants on slow to moderate speed applications. Contact-type, Plya-Seals seal out abrasive or corrosive material, seal in factory prepacked lubricant.

Less Maintenance — In many applications, non-relubricatable bearings may be used. They require virtually no maintenance time or expense. In other applications, where bearings receive hard or constant use, relubricatable types are available. They require only occasional greasing, even under severe conditions.

Longer Service life — Plya-Seals protect against premature bearing wear or failure. Contaminants cannot damage balls or races; sealed-in lubricant ensures against bearing "running dry".

Simplified Designing — Bearing housings may be designed without incorporating separate housing seals. Plya-Seals provide full protection; make possible simplified, less costly, more compact housings.

Power Transmission Units incorporating new Fafnir Plya-Seal Wide Inner Ring Bearing

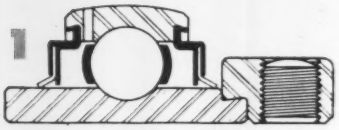


RAK and RAS Type Pillow Blocks — RCJ Type Flange Cartridges — Fafnir Flangettes

Write for bulletin containing complete specifications on Fafnir Plya-Seal Wide Inner Ring Ball Bearings and Power Transmission Units. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

1



PLYA-SEALS

As incorporated in the Fafnir Plya-Seal Wide Inner Ring Ball Bearing, the Fafnir Plya-Seal consists of a synthetic rubber-impregnated fabric sealing washer sandwiched between dished steel plates. Seal flares out, maintaining constant contact with ground outside diameter of inner ring. Years of service have proven Plya-Seals the most effective seal ever developed for ball bearings.

2

SELF-LOCKING COLLAR

Originated by Fafnir, this famous development has cut costs and simplified assembly throughout industry. Bearings slip onto shaft; are locked securely with simple twist of self-locking collar. No need for lock nuts, shoulders, sleeves, washers, or adapters. Positive binding action increases with use.

Technical Outlook

AUTOMATIC ARCS STEP AHEAD—A rash of welding developments adds to evidence that equipment makers are banking on industry's increasing interest in cost saving automatic and semiautomatic machines. (STEEL, Mar. 10, p. 81, reported sales gains.) Lincoln Electric Co., Cleveland, will demonstrate a new automatic method called Innershield at the St. Louis welding show in April. It features a cored wire which produces its own gas shield. The firm also has just introduced an improved semiautomatic welder (ML-3) which combines a conventional flux and a light, portable gun which runs itself.

KITCHEN COMBINATION— New in appliances: A combination refrigerator and hot water heater. Heat drawn from the refrigerator is transferred to the water. The unit was developed by Comstock & Wescott Inc., Cambridge, Mass. It should appear on the market soon.

MISSILE NEWS— The Navy's Vanguard missile and its satellite use a variety of materials. Brooks & Perkins Inc., Detroit, reveals that magnesium forms the skin of the tail can and the spacer between the first and second stages. The satellite has a gold-plated magnesium skin. Magnesium-thorium is the skin for the second stage. Its tankage is stainless. The skin and tankage of the first stage are aluminum. The nose cone is a molded asbestos phenolic with a titanium tip.

LAUNCHING REFRACTORIES— Products of the refractory industry are now used in the construction of pads for launching rockets. Harbison-Walker Refractories Co. furnished H-W Extra Strength Castable for the pad from which the Explorer was launched at Cape Canaveral, Fla. It's similar to a material used in soaking pit covers.

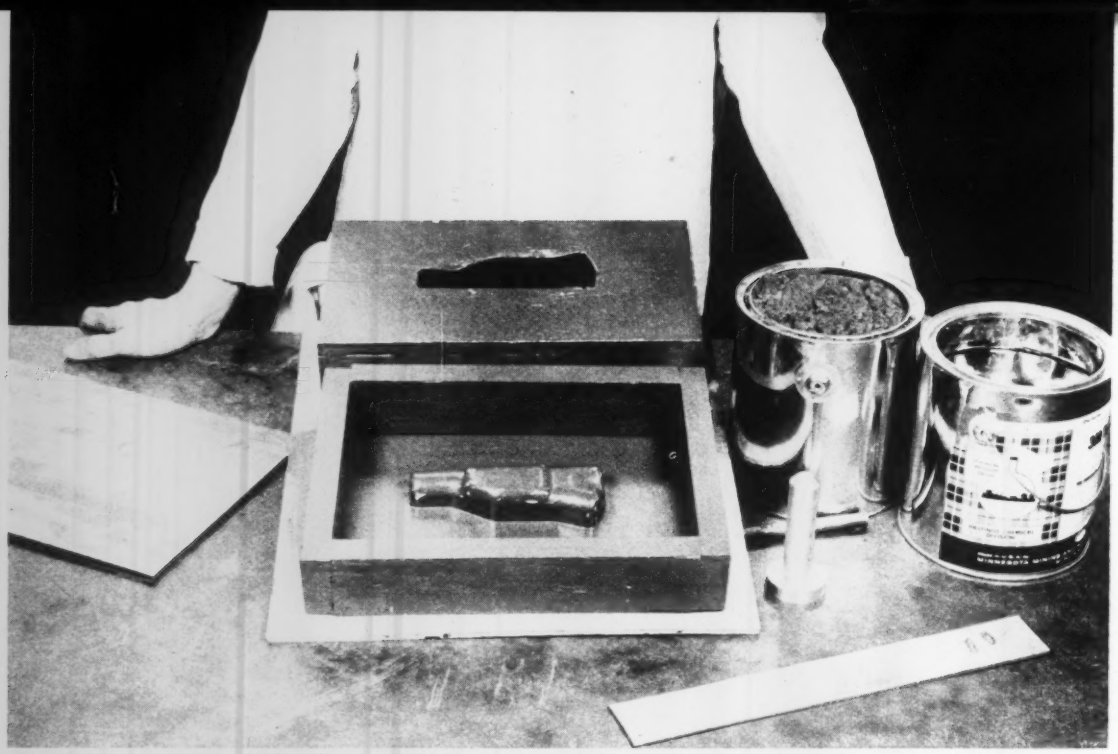
WORKING MAGNESIUM-THORIUM ALLOYS—Some tips from Dr. Larry Silverstein of Dow Chemical Co.: External radiation is not a problem in production and fabrication of the alloys. Melting and chemical milling may require local exhaust ventilation. Welding definitely requires adequate exhaust to control exposures. Mechanical processes involved in fabrication seem to be adequately controlled when the proper fire precautions for magnesium are observed.

FATIGUE BUBBLES— Researchers at the National Bureau of Standards, Washington, note that fatigue test specimens give off bubbles when cracks start to form around highly stressed areas. Specimens were covered with transparent tape before testing to trap the escaping gases. The bureau feels that the observation may lead to a quick method of detecting fatigue failures long before they happen.

SUPER-SENDZIMIR MILL— Wallingford Steel Co., Wallingford, Conn., is particularly proud of two innovations on its new 27-in. Sendzimir mill. An IBM punch card system automatically presets the mill for the required strip thickness, lessening the possibility of error in the setting. Elongation gaging equipment, for use principally on hardening passes, determines thickness reduction by strip elongation when the reduction is too slight to be measured more directly.

MONSTER MILLER—Two carbide-bladed milling cutters 75 in. in diameter comprise the business end of a billet scalper at the Ravenswood, W. Va., plant of Kaiser Aluminum & Chemical Co. Consolidated Machine Tool Div., Farrel-Birmingham Co. Inc., made the machine. Wesson Co. made the cutting blades (it claims they're the world's biggest). They'll scalp an aluminum ingot in 90 seconds, a job that formerly took about 10 minutes.

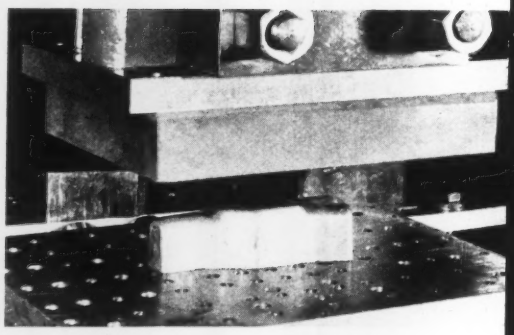
DUCTILE CERAMICS— Big, pure ceramic crystals (magnesium oxide is one) have been bent and twisted cold without breaking. The feat was duplicated at NACA laboratories, Cleveland, and the University of California at Berkeley. The long-accepted principle that refractories and other ceramics are by nature brittle appears to be on shaky ground.



Operation starts with patterns like these. They are lacquered and coated with a hard carnauba wax to prevent sticking. Treated steel powder and epoxy liquid are at the right

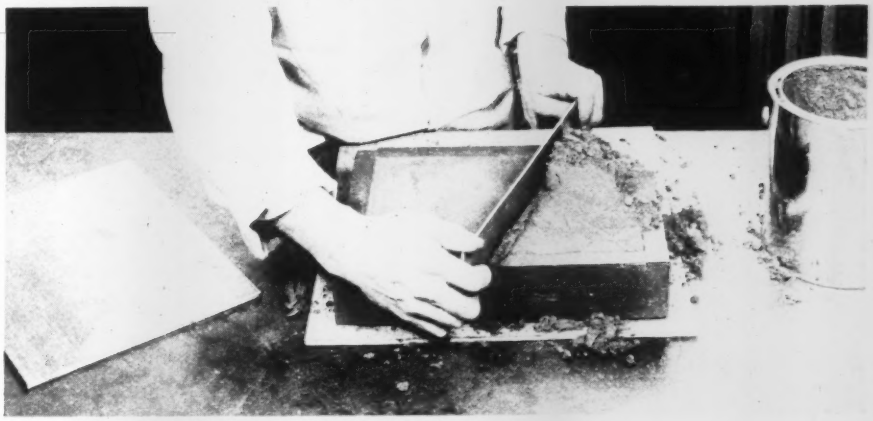
Dayton Rogers forms cable splicers with its new plastic die in this setup. Hold-down has been added. Blanks and formed parts are shown on bed plate above operator's hand

Here's a

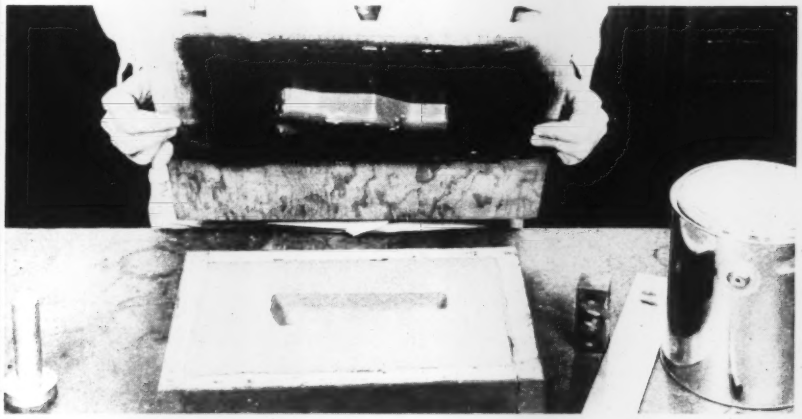


Here is the completed die without a lower hold-down plate. Punch and die have been tapped for mounting on standard shoes

1 The steel powder is rammed into the mold and the excess raked off. Steel plate (left) is placed on top



2 Pattern and mold box are inverted. Operator then removes the pattern and mold box, leaving the die ready for baking. (Female is shown)



3 Die is placed in oven to dry at 300 to 320° F. Dried die is placed in a shallow pan with epoxy liquid. Die soaks up liquid which hardens during a second baking. Curing takes 12 to 16 hours

Better Plastic Die

It's made with a treated metal powder and an epoxy liquid. Construction takes 90 per cent less time than a conventional tool does. The die is easily machined

A NEW epoxy die material contains a filler made of steel powder.

Called compound 113, it is said to be ideal for forming tools, corners, irons, and even complex draws. The producer, Minnesota Mining & Mfg. Co., Minneapolis, names these advantages:

1. The mixture has a compression strength of around 25,000 psi, plus good impact and abrasion resistance.

2. It's easily machined.

3. It has good thermal conductivity which prevents heating during deep draws (0.6 Btu/hr/sq ft/°F).

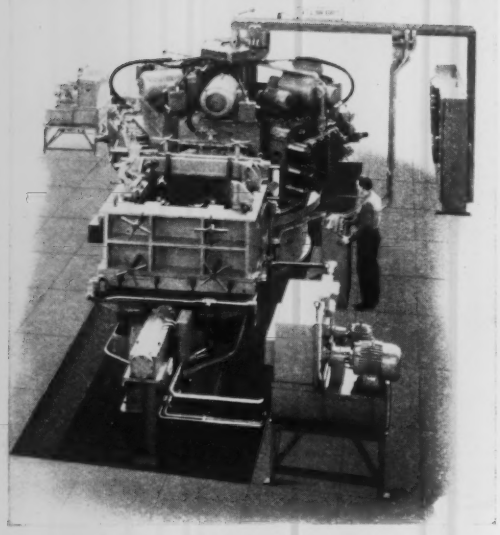
4. The formula requires no mixing or weighing.

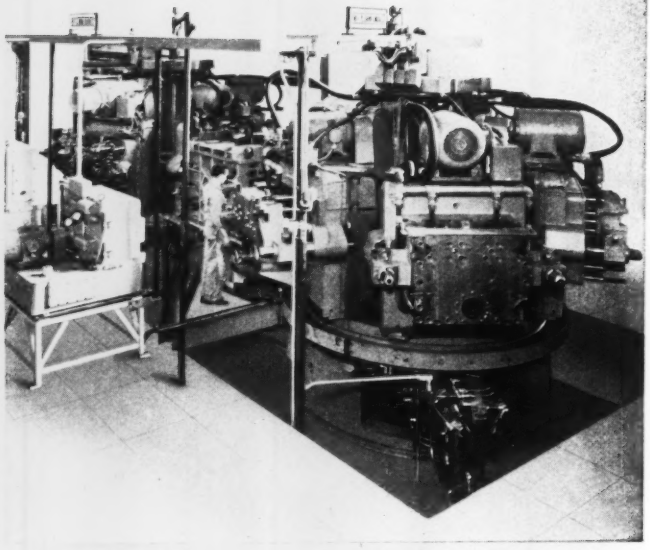
Example — Dayton Rogers Mfg. Co., Minneapolis, saved 18 days and $621 by making a forming die out of the new material. The product: A cable splice about 2 in. wide and 6 in. long. Parts of the draw are 7/8 in. deep. Stock is 0.036 in. cold rolled steel.

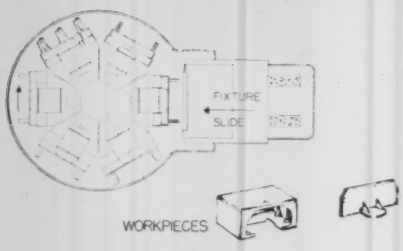
From pattern to finish, the die required 4.8 manhours over a period of three days. A conventional tool would have required three weeks, not including machining for mounting.

Punch and die are bolted to a 45-ton Bliss press just as a regular die is mounted. It requires no frame or box. Production is about 600 pieces an hour. Die wear was negligible after 2000 parts were made.

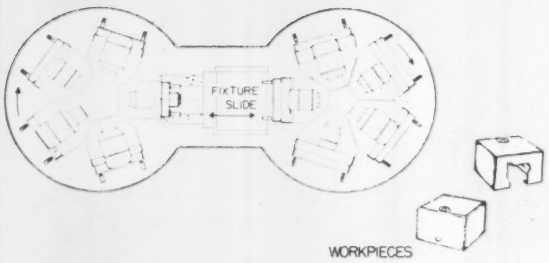
Composition—Compound 113 has two parts: A treated metal powder which can be formed yet holds together well while green and a thermosetting liquid which impregnates the preforms to make them permanent and durable.







1. SINGLE TABLE, SINGLE SLIDE
187 Total Spindles



2. TWO TABLES, SINGLE SLIDE
325 Total Spindles

Family of Specials Tackles Short Runs

Basic design uses rotary tables and fixture slides. Variations provide unusual flexibility. Replacing standard machine tools, they will cut floor space requirements 80 per cent

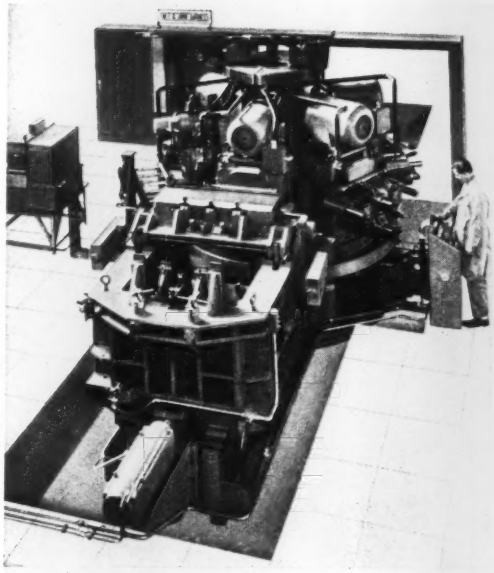
HERE'S the problem: You've got workpieces that require a lot of machining. You make enough of them (small but repetitive lots) to justify the purchase of special machines; perhaps even a touch of automation will help cut costs. But the parts are large, bulky. It's impractical to try to move them down a transfer line past a row of machine stations. What's the answer?

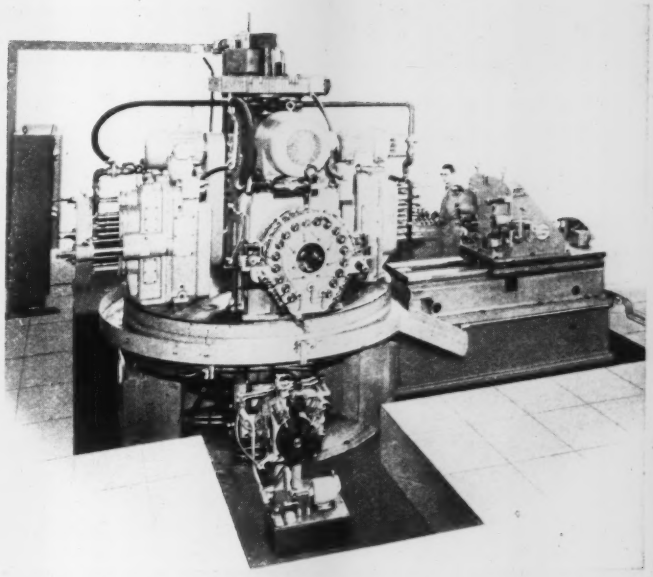
Solution—A major maker of road building equipment took this problem to the machine tool industry. He was advised: Move the machines to the work.

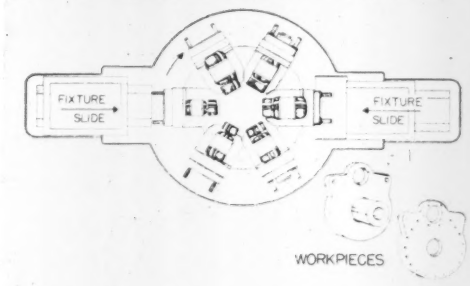
Engineers at W. F. & John Barnes Co., Rockford, Ill., took an unusual approach to special machines. Their answer: Mount the machines on a turret and put the cumbersome parts on fixture slides. As the turret indexes, new machines move to the work.

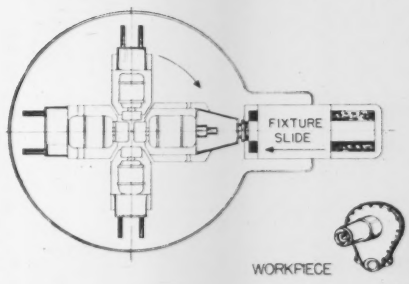
Variations—With this basic design, individual machines become stations on the rotary table of a larger machine, to be moved to the workpiece as required.

The big machines can be tailored to meet job requirements—one table









3. **SINGLE TABLE, TWO SLIDES**
67 Total Spindles

4. **SINGLE TABLE, SINGLE SLIDE**
69 Total Spindles

and a single slide, two tables, two slides or different numbers of stations on the tables.

Savings—Four of the six machines Barnes developed for this customer are variations on this design theme. All work on more than one part.

Until now, these machining jobs have been done on standard machine tools, mostly radial drills and jig borers. Grouping several machines (table stations) into one, the new approach cuts floor space requirements 80 per cent. Design and operating advantages save about 50 per cent on equipment costs.

Important savings will also come in both machining and work handling time.

Here is a brief rundown on the four machines:

1. A turret type machine with a 6-station rotary table and shuttle holding fixture, it will drill, ream, chamfer, and tap three different welded steel cases and the different covers for each.

The work saddle is mounted on 40-in. ways and has three feed rates. The 96-in. rotary table weighs about 40 tons.

2. A turret type machine with two 5-station rotary tables, one at each end of the work slide, it will drill, ream, chamfer, and tap the three steel cases previously machined on No. 1.

The way and table dimensions are the same as on machine No. 1, and the weight of each table is about 40 tons.

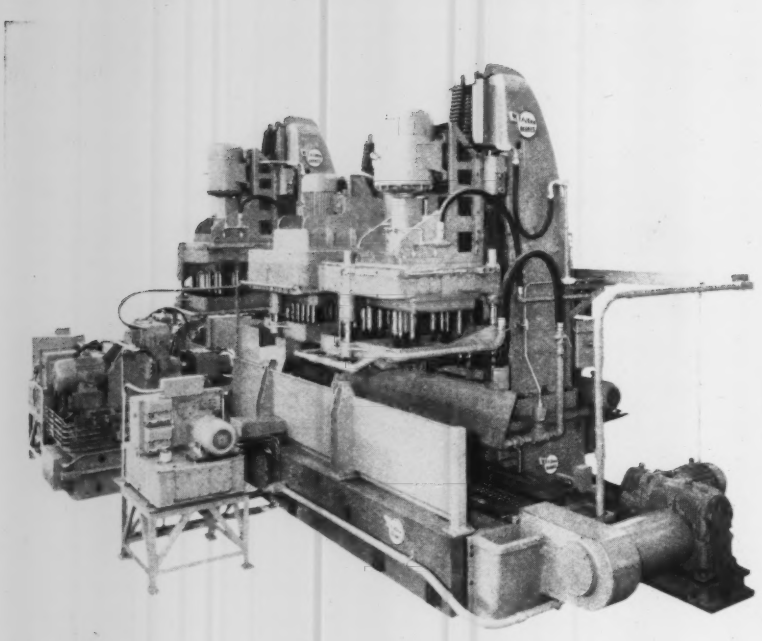
3. A turret type machine with a center 6-station rotary table and two work slides, it will drill, bore, chamfer, and tap the three steel cases previously machined, plus two different differential gear covers.

Dimensions of the slides and tables and the weight of the table, are the same as those of the other two machines.

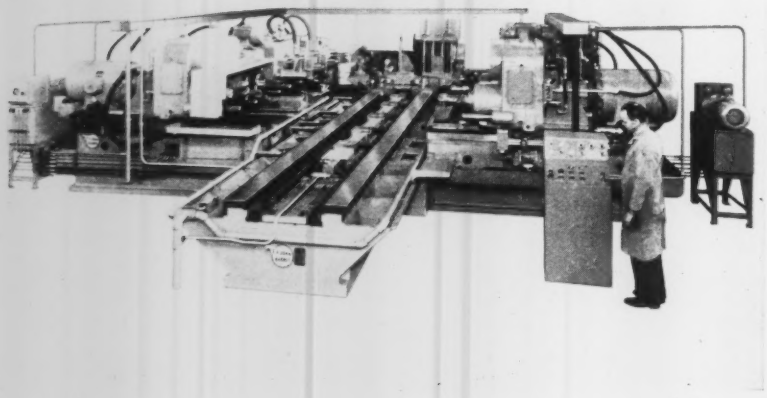
4. A turret type machine with a 4-station rotary table and a work slide, it will drill, bore, chamfer, and tap two different gear covers that were started on machine No. 3. The fixture saddle is mounted on 24-in. ways. The table is 96 in. in diameter.

Two More—Using a more nearly standard approach, the last two machines in this group move workpieces past machine stations. One, a 5-station shuttle type machine, mills and drills four different welded steel roller frames. It has a combination of vertical and horizontal machine heads.

The other machine is a horizontal, 7-station shuttle type. It drills and bores two different cast steel frame parts, one for righthand and one for lefthand application. Both parts



Four different roller frames, right and lefthand in two sizes, are milled and drilled on this machine. Production rate: 2.81 parts an hour



Right and lefthand steel castings are drilled, bored, chamfered, and tapped on this 7-station transfer machine. Production averages 3.20 parts an hour

can be mounted in the same fixture. The right-left problem is solved simply by rotating the fixture 180 degrees in the machine to present opposite surfaces to the tools.

Potential — Barnes engineers are convinced the rotary-table approach has good potential for the short-lot manufacturer. The principles, they say, can be economically adapted to low production work, for either larger or smaller workpieces, where a competitive cost must be maintained and the conservation of capital expenses and floor space are important.

Bolt Holds Presses

Self-locking feature pays for itself by cutting maintenance and machine downtime

YOU can practically eliminate chronic looseness in stamping presses with self-locking nuts and screws, says Prosperity Co. Inc., Syracuse, N. Y.

It operates 500 and 1000 ton hydraulic presses which blank, pierce, and form parts for laundry and dry cleaning equipment.

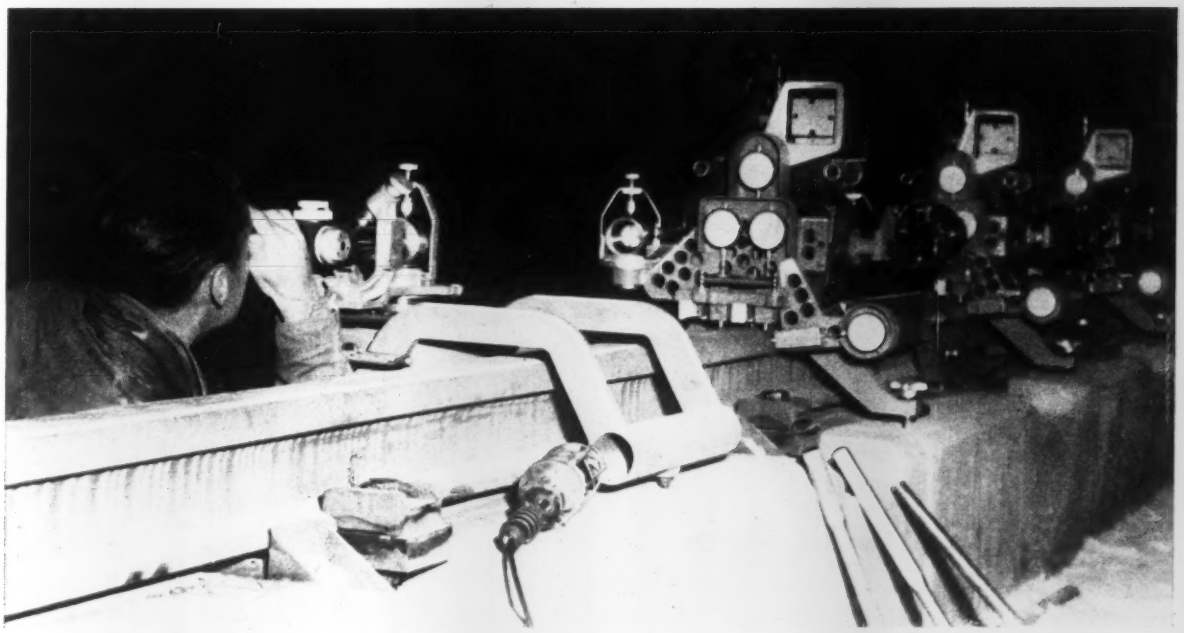
Problem—Blanking and piercing runs on ½-in. boiler plates and ¼-in. stainless loosened fasteners in the Prosperity Co.'s presses in a short time. It took two men 3 hours each Saturday to tighten them (at overtime rates). Occasionally, the process had to be repeated during the week.

Installation of self-locking cap screws and nuts at critical points eased the problem. The plant superintendent says his maintenance men tighten fasteners only once every five months—a reduction of around 90 per cent.

Construction — Self-locking nuts and screws like those made by Standard Pressed Steel Co., Jenkintown, Pa., have a nylon pellet inserted in the threaded section. When in position, it pushes mating threads closer together, increasing friction enough to resist shock and vibration.

Such fasteners are re-usable. The nylon pellets hold their resiliency.

Self-locking screws secure gib plates to ways on this HPM 1000-ton press. One tightening lasts five months



Operator is sighting track gage during rail alignment. He can position each gage by remote control. Four fingers control track during adjustments of 100-ft increments. Night work eliminated daytime diffraction problems

Here's a King-Size Alignment Job

PROBLEM: Align a railroad track 7 miles long to a tolerance of 0.005 in., and keep it that way in temperatures that vary from below zero to 120° F.

SOLUTION: Stretch 2 mile long sections 5 ft to prevent buckling; align them with special gages; weld the joints and grind them to within plus or minus 0.0025 in. of the adjoining surfaces.

That's the way Delta Design Engineers Inc., San Diego, Calif., installed a track for supersonic rocket sleds which are testing missiles at Holloman Air Force Base, N. Mex.

Expansion—To prevent buckling, each section of track (three are 2 miles long, one is 1 mile long) was welded into a continuous piece, then stretched 5 ft with a hydraulic jack and anchored. Track sections are always in tension at temperatures below 120° F.

The contractor also built a wide variety of special instruments to align the track in 100 ft intervals. A line of sight was established and track gages with dial fingers placed at intervals. The instrument operator controlled the position of the track gages, aligned them with the line of sight, and corrected or adjusted the track location for deviations like earth curvature and slight topographical changes. Workers adjusted the track vertically or horizontally. Operators work at night to avoid diffraction (optical) problems caused by daytime temperatures.

Methods—Slight variations in track dimensions at several times the speed of sound (up to Mach 4) could destroy both track and sled.

Delta made a belt grinder to finish outside, inside, and top surfaces of all welds. It uses two electric-powered belt grinders. Each has a counterbalanced arm which keeps the grinder spindle exactly parallel to the track surface. Depth of cut is controlled by a follower on each side of the head.

Other Features — Interrupter blades clock the speed of the rocket sleds. They are placed at 13 ft intervals with an accumulated location error of less than 1 in. in 7 miles.

Engineers used an Invar tape to adjust the blades. The tape was calibrated to 130.0000 ft. A compensator automatically corrected readings for the temperature changes.

Studs for mounting the blades were shot into the concrete foundation with an explosive stud setter.

Angle plate tips the bearings so they contact the blade gradually. Stepped clamping bars and segments on the base plate locate the workpieces

Saw Cuts Bearing Costs

Tooling is kept simple to accommodate many different workpieces. Minimum time is needed for re-setup. Narrow blade also makes the final boring job easier

SAVINGS from band sawing with simplified fixtures have paid off machine and tool costs in less than two years at Worthington Corp., Buffalo.

The technique greatly reduces the cost of splitting friction bearings for large industrial engines and compressors, says W. J. Reich, Worthington's chief tool engineer.

The bearings are centrifugally cast shells, lined with a thin layer of babbitt (maximum is 0.007 in.).

Old Way—After boring, the bearings were split into mating halves on a milling machine. Milling and finish boring were critical and costly operations.

The thin lining made close tolerances essential. A wide range of sizes with short production runs on any one size kept tooling costs high. Many different sets of milling fixtures were required, and frequent changeover meant a great deal of machine downtime.

New Way—Bearings are split on a DoAll bandsawing machine. A single clamping fixture with adapters handles the complete range of bearing sizes. Floor-to-floor time for splitting a typical bearing (diameter, 10 in.) is only 5 minutes. Changeover for different part sizes also has been speeded up.

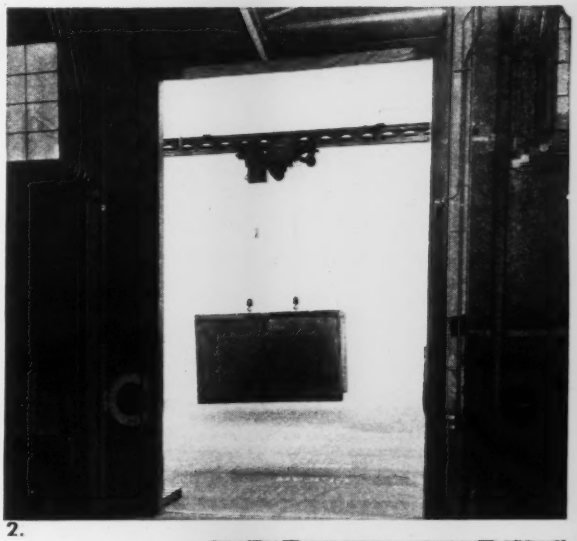
Tooling—An angled base plate, mounted on the saw table, is drilled and tapped to take semicircular locating segments of different sizes. The angle provides gradual engagement of the saw in the work and helps to control the length of engagement.

Bearings are held in the fixture by clamping bars. They are drawn down by tightening nuts on upright bolts placed in the fixture on both sides of the saw. Stepped design of the clamping bars, with a long thread on the bolts, provides for all bearing heights. Slots in the bars provide easy removal with relatively little unwinding of the nuts.

Second Operation — The narrow bandsaw blades produce a kerf only 0.028 in. wide. A light milling cut is sufficient to finish the sawed edges.

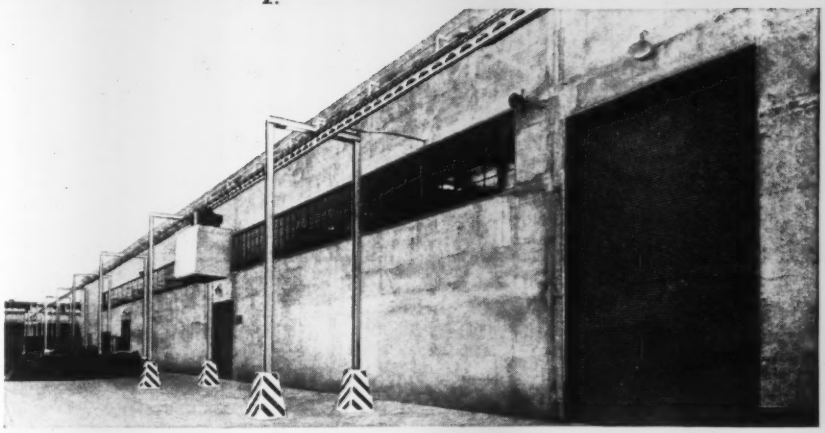
Finish boring is still necessary because the reassembled halves of a split bearing no longer form a true circle. The metal removed in splitting makes the assembly elliptical. But because less metal is removed by the saw blade, the metal to be removed in finish boring is also reduced.

1.



2.

1. Loading carrier van with power truck.
2. Up she goes. Depressing wall button sends carrier on its way.
3. En route to another building.



3.

Robot Carrier Delivers Materials Automatically

WITH a Cleveland Tramrail Robot Carrier, it is no problem to move materials between buildings. Heavy loads can be dispatched great distances without operators, safely, at low cost. The equipment opens and closes doors, if necessary, and stops automatically upon reaching the selected delivery point.

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CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
7809 East 290th Street, Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Quick Facts on R-N

- The process is adaptable to a wide variety of low, medium, and high grade iron ores.
- Solid carbonaceous fuel of nonmetallurgical quality can be used—coke breeze, for example.
- Up to 95 per cent rejection of sulfur and phosphorus is possible, resulting in an end product with a maximum of 0.05 per cent sulfur and 0.07 per cent phosphorus from ores and fuels high in these elements.
- Iron recovery ranges from 80 to 95 per cent, mostly as metallic iron.
- The final product is suitable as feed for open hearth and electric furnaces. A blast furnace feed product can also be produced.
- All the equipment is conventional and readily available.
- The final products promise competition for scrap on the basis of iron value, uniform known composition, and stable price.
- In combination with the electric furnace, the process will be competitive with the blast furnace-open hearth combination in many areas.

Direct Reduction Is Closer

Reports on the R-N process at AIME annual meeting were optimistic. Adaptability, standard equipment, reasonable costs move the process up front in the direct reduction race

THE R-N PROCESS for direct reduction of iron ore, a joint development of Republic Steel Corp. and National Lead Co., looks like it's about ready for commercial practice.

Details were revealed at the annual meeting of the AIME in New York. Four papers by Republic and National Lead personnel explored the operation and economics of the process. Conclusions: 1. R-N products are ready to compete with scrap. 2. In combination with electric furnaces, the process offers a true challenge to the blast furnace-open hearth team.

Background—A large pilot plant operated by Republic Steel at its Spaulding Mine near Birmingham has processed more than 100,000 tons of ore. (See diagram, Page 104.) Most of it has been low grade hematite from Red Mountain, but titaniferous Adirondack concentrates have also been reduced.

The Spaulding pilot plant is the culmination of some 15 years of research that began in Norway. The process grew out of a kiln roasting and beneficiation method developed by National Lead for concentrating titanium from titaniferous ores. The Norwegian plant experimented with Adirondack titaniferous ores and Minnesota taconite concentrates before the American pilot plant was built.

Rotating Kiln—The process starts with kiln roasting, which is followed by steps in which the products are concentrated. All equipment, including the kiln, is conventional, although the kiln is modified to provide controlled air inlets along its length. They are critical to the process, which requires a closely controlled high average temperature throughout the reduction zone.

The feed is ore crushed to minus 1 in. (or balled ore fines), crushed limestone, and cheap solid carbonaceous fuel, which may be coke breeze, char, culm, anthracite fines, or nonmetallurgical coke. It passes down the kiln, counter to the flow of heat. Heat is provided by a gas or oil burner at the exit end and by the burning solid fuel.

Reduction—Temperature for reduction varies for each different ore within the range 1830 to 2150° F. Feed and temperature conditions are varied to carry on the reduction without the formation of low melting-point slags.

As reduction proceeds, the ore particles (in the case of magnetite) change without melting from Fe_3O_4 to FeO and finally to metallic iron. Under proper operating conditions the iron particles do not weld or oxidize; clinkering and ring formation—shortcomings of most kiln processes—are prevented.

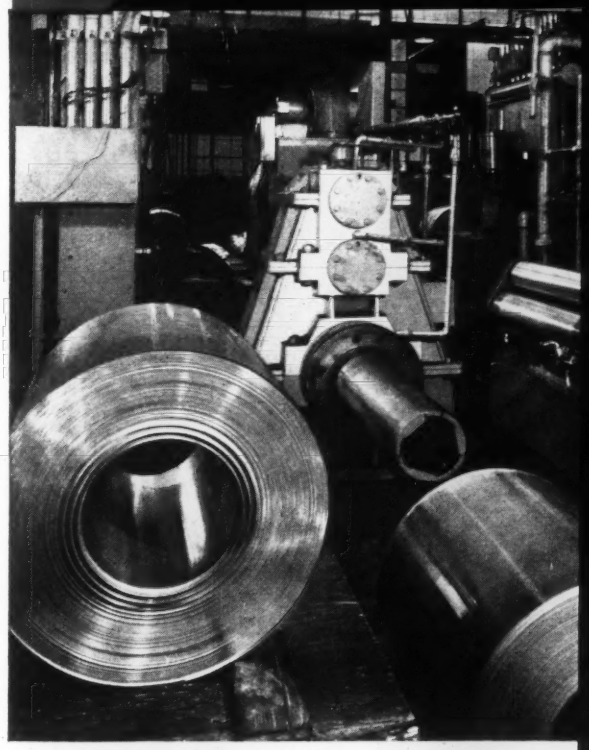
Concentration—The raw product from the kiln must be cooled, crushed, and the iron-rich fraction separated and concentrated before it can be pressed into briquets. Magnetic separation is used extensively. The rich-in-iron material is separated from the lean-in-iron material at an early stage of the circuit, and unburned fuel is recycled.

Clinton ore averaging 35 per cent iron has been processed in the pilot kiln at a rate of about 7 tons an hour. The final compacted products average 89 per cent iron, 85 per cent of it metallic.

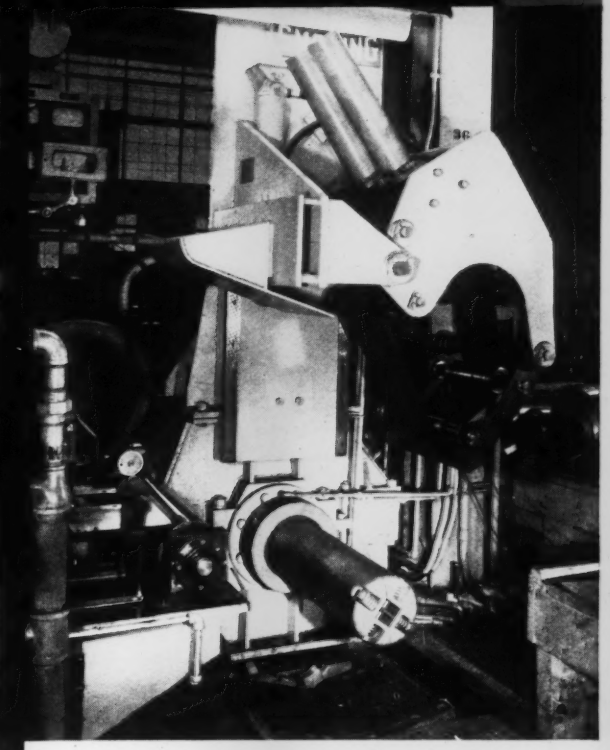
Briquets—Two different products have been made. One is a high grade product containing metallic

Auxiliary Equipment
by Pittsburgh

4 HIGH COLD ROLLING MILL



Mandrel Type Payoff Reel



Tension Reel and Belt Wrapper

The auxiliary equipment illustrated above is representative of numerous installations designed and built by Pittsburgh in many leading metal fabricating plants. Consult us for your ferrous or non-ferrous mill equipment requirements—from major mill construction to small auxiliary jobs.

"Electric and open hearth steel castings from 1 lb. to 100 tons"

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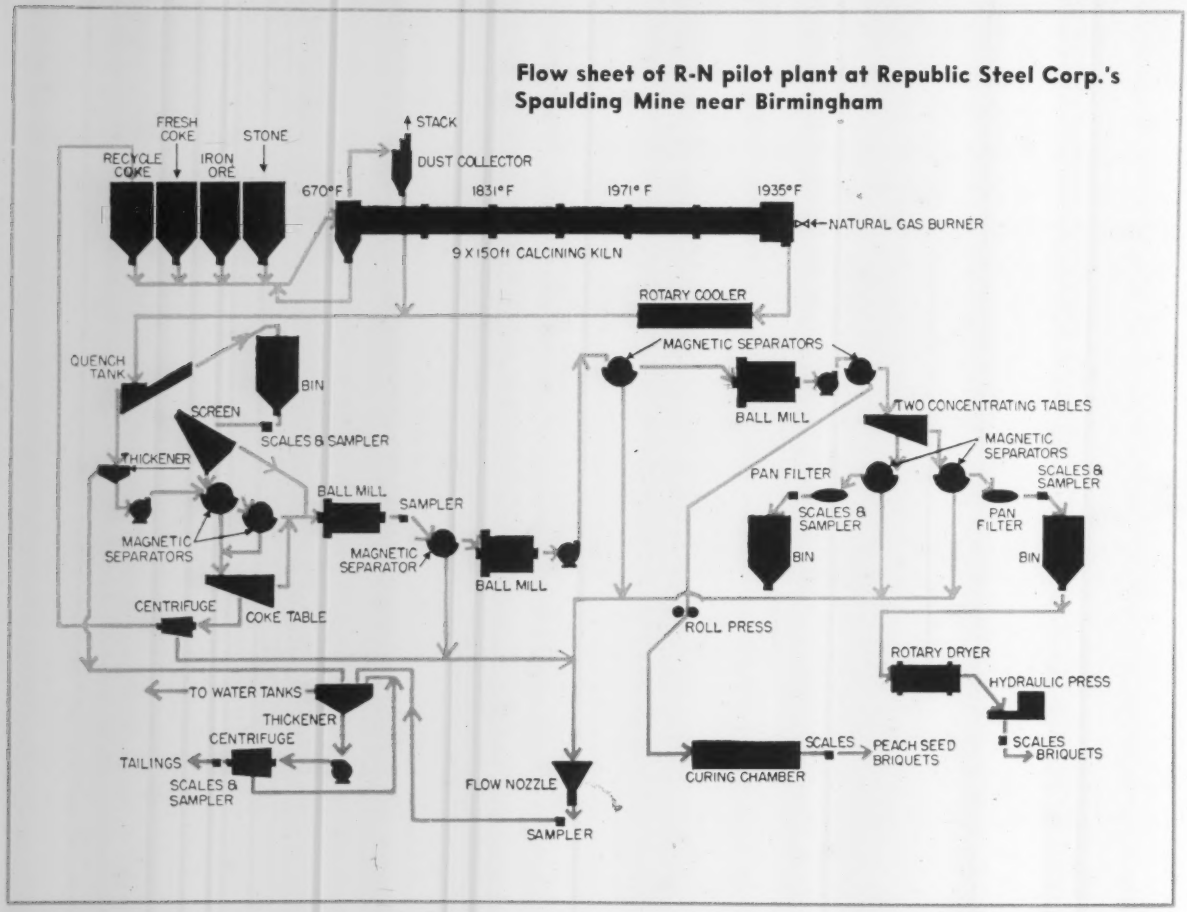
Flow sheet of R-N pilot plant at Republic Steel Corp.'s Spaulding Mine near Birmingham



PROGRESS . . .

iron in excess of 90 per cent and less than 3 per cent silica. It is prepared for open hearth or electric furnace feed by compacting it into 25 to 30 lb briquets in a hydraulic press.

The other is a standard product (80 to 85 per cent metallic iron, 4 to 8 per cent silica) which is roll-pressed into peach seed briquets for blast furnace feed. The high grade concentrate makes up 70 per cent of the total.

Value — Generalizations about costs for any direct reduction process are full of "it depends." A preliminary estimate: An R-N plant which produces 400,000 gross tons of briquets a year from southern Clinton ore works out to $48.41 a gross annual ton; the total plant, including indirect costs, comes to $19,364,000.

But any cost picture depends on the nature of the ore, location of the plant, whether it is designed to supplement or compete with other iron producing methods, and savings possible through the use of R-N products—they can be considerable.

Uses—For instance, the process makes a cold charge low in phosphorus from high phosphorous ore. Such a pig substitute at a price competitive with steel scrap should be welcomed by the southern foundry industry which needs low phosphorous material for its cupolas. It

R-N Products from Different Ores

CONSTITUENT	MINEVILLE, N. Y., ORE		ALABAMA CLINTON ORE			CANADIAN CRUDE WASH ORE		
	Magnetite Concentrate	Briquetted Product	Dry Ore Feed	Concentrates High Grade	Concentrates Standard Grade	Dry Ore Feed	Concentrates High Grade	Concentrates Standard Grade
Total iron	69.26	96.48	34.9	90.0	82.3	29.85	94.8	76.5
Metallic iron	...	...	...	86.0	80.0	...	88.5	86.0
Silica	3.56	0.54	26.8	2.6	5.3	55.10	0.95	20.6
Alumina	0.96	0.24	3.2	0.8	2.5	1.18	0.04	0.31
Lime	0.36	0.41	7.6	2.4	4.7	0.31	0.08	0.47
Magnesia	0.22	0.82	0.4	0.08	0.62	0.14	0.07	0.38
Manganese	0.06	0.05	0.2	0.08	0.12	0.16	0.04	0.13
Sulfur	0.01	0.02	0.06	0.03	0.06	0.01	0.03	0.03
Phosphorus	0.08	0.03	0.3	0.04	0.3	0.04	0.01	0.03

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Estimated savings of $35,000 a year are reported by the Duriron Company, Inc., Dayton, Ohio since applying the Stanley Steel Strapping System to the packaging of Duriron Corrosion Resisting Pipe. Elimination of wooden crates meant lighter packages that lowered shipping costs. The great reinforcement strength of Stanley Steel Strapping minimized breakage and reduced damage claims.
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SPECIAL REPORTS ON FINISHING NON-FERROUS METALS

NUMBER III—Lustrous, Corrosion-Resistant Finishing with Chemical Polishing Iridite

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

Chromate conversion coatings are widely accepted throughout industry as an economical means of providing corrosion protection, a good base for paint and decorative finishes for non-ferrous metals. Certain of these coatings also possess chemical polishing abilities that have luster-producing, as well as corrosion-inhibiting, effects on zinc and cadmium plate, zinc die castings and copper alloys. However, continued developments in this field have been so rapid that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this discussion of the many ways in which this chemical polishing characteristic can be used in final finishing or pre-plating treatments to produce a lustrous appearance with distinct display and sales appeal and appreciable savings in cost. Report I on decorative, corrosion-resistant finishes and Report II on paint base corrosion-resistant finishes are available on request.

The degree of luster possible on a surface is a function of the degree to which the surface can be smoothed. Leveling to provide a smooth surface can be achieved by mechanical or chemical means, or a combination of these, depending upon the luster desired and the original condition of the metal. Chemical polishing effectively imparts luster otherwise difficult and costly to obtain. For this reason, it is often used to supplement or entirely replace mechanical polishing, depending upon the application and the original condition of the metal. Chemical polishing has the additional advantage of providing overall treatment of the submerged part. It reaches into even the deepest corners and recesses that are otherwise inaccessible. Certain of the Iridites are specifically designed to perform this chemical polishing operation. Also, they provide corrosion protection as do all Iridites, thus may be used as a final finish or a pre-plating polish.

If Iridite is to be used as a final finish, in contrast to pre-plating treatment, the chromate conversion coating generated is allowed to remain, providing good corrosion resistance. Color inherent in these Iridite films ranges from a yellow cast to yellow iridescent. These coatings may be used without further treatment where this color is acceptable and good corrosion resistance is desired. Further, these basic coatings can be tinted by dyeing. Among the dye tints available are shades of red, yellow, blue and green. If desirable, the basic coatings can also be modified by a bleach dip leaving a clear bright or blue iridescent finish. In all cases bleaching reduces corrosion resistance.

As examples of this type of final finishing, Iridites #4-73 and #4-75 (Cast-Zinc-Brite) make possible for the first time, lustrous chemical polishing of the as-cast surface of zinc die castings. Thus, in many cases, sizeable savings in finishing cost are realized by elimination of plating costs. This economical method can be used on tools, appliance parts, toy pistols, locks and many other small castings. Another example is the treatment of copper and brass parts, such as welding tips, to eliminate buffing and provide additional corrosion resistance. In many cases, handling costs are reduced appreciably by replacing piece-part handling with bulk processing. Still another example of the use of this chemical polishing and protective quality of Iridite is a simple system of zinc plate, Iridite and clear lacquer instead of more costly electroplated finishes. Typical of this type of lustrous finish are builders hardware and wire goods.

As a pre-plating treatment, in contrast to final finishes, Iridite can be used to chemically polish zinc die castings or copper prior to plating. In such cases, Iridite should be applied as an in-process step, so that the protective film is removed before the plating cycle. The savings in handling, material and labor costs are obvious. This process has made it practical to plate chrome directly over copper on steel, conserving nickel, yet producing a lustrous chrome finish. Used after stripping faulty plate in reprocessing zinc die castings, Iridite restores luster to the casting, thus making possible replating without blistering.

Other Iridite finishes are available to produce maximum corrosion resistance, a wide variety of decorative finishes and excellent bases for paint on all commercial forms of the more commonly used non-ferrous metals. As a final finish, appearance ranges from clear bright to olive drab and brown and many films can be bleached or dyed. As a paint base Iridite provides excellent initial and retentive paint adhesion and a self-healing property which protects bare metal if exposed by scratching. Iridites have low electrical resistance. Some can be soldered and welded. The Iridite film itself does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of their top performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product demands the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.

also offers Republic (and presumably other steelmakers) a route around the duplex process.

Other plus values are: 1. Uniform shape of briquets makes for ease of handling and compact storage. 2. High density (225 lb per cubic foot) resulting in efficient melt-down in the electric furnace. 3. Uniform analysis, with low values for sulfur, silicon, phosphorus, and titanium, and freedom from tramp elements.

Republic has tried many thousand tons of R-N briquets in its electric furnaces. Melters like them. The steel made from them is of excellent quality. The only big objection from the melt shops has been that the size and shape of the briquets could be improved. Republic is now working on that.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Ups Painting Output

Modernization in the finishing department has paid off for the Pump Div., Bowser Inc., Ft. Wayne, Ind. Conveyors, electrostatic spray painting, and a new oven have enabled the firm to meet increased production demands of about 1000 gasoline pumps per month.

Example: Painting—More than 900 variations in color are specified by customers. Five or six color changes a day are common. Peak production was 150 units per day. It's now double that. In addition, labor and stockpiling requirements have been reduced.

One shift now handles the increased load; two were formerly used. The electrostatic unit with a reciprocating disc can paint 55 housing and parts sets in 1 hour (the old rate was 15). Much better paint mileage is evident, too—seven sets per gallon vs. four, a 75 per cent increase.

Previously, housings were sanded for the final coat, but this step is eliminated by uniform electrostatic application. Since compressed air isn't used, dust control is minimized. Maintenance in the paint area has been reduced 50 per cent.

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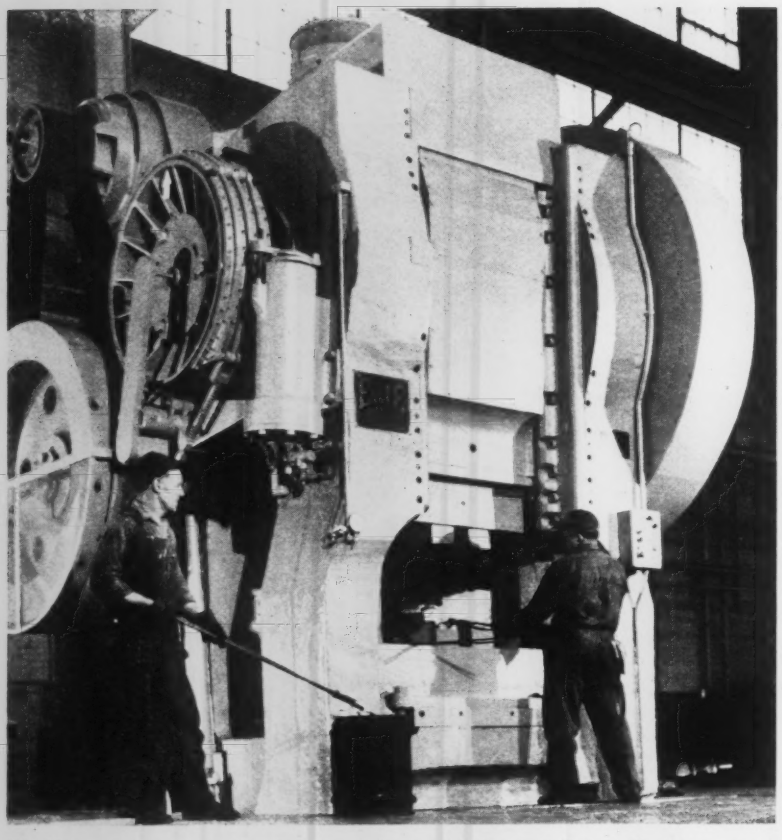
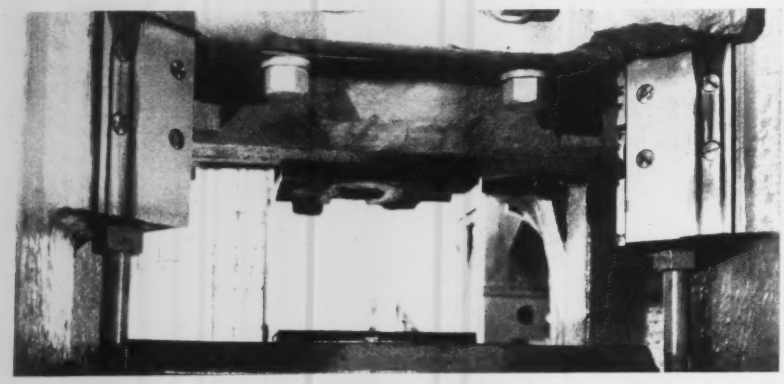
MACHINE SCREW DEPARTMENT BRIDGEPORT 2, CONNECTICUT



Working area on new forging press is moved forward 8 in. It allows more clearance to manipulate work in and out of die

Designed for User Wants

Erie Foundry Co.'s new 2500-ton forging press is keyed to ease of operation and maintenance. That's what users said they wanted in a survey the company made



Auxiliary guides are installed on back of ram at bottom of stroke

IF YOU'RE redesigning your product line or adding to it, take a tip from the technique used by Erie Foundry Co., Erie, Pa. It went to the users.

Forging hammers are the firm's primary product. But its management foresaw a trend to more use of press forging and wanted to add a line of mechanical presses.

Survey—The preliminary design was worked out after a survey made by Robert E. Sanford, Erie's design engineer. He called on press users, talking to plant managers, superintendents, and maintenance men to find out what they wanted in a forging press.

Armed with the results of the survey, engineers drew up the design. Loaded with blueprints, Mr. Sanford repeated his calls to check out the design.

More suggestions were incorporated in a redesign. Another change came later to solve a problem in guiding the ram.

Final Design—Net result of the surveys was the 2500-ton mechanical forging press the firm recently introduced. It is one of a line that has a capacity range of 1000 to 6000 tons.

It has nearly all the design features buyers wanted.

Some of the features: More room to work was provided for the operator by spreading the front columns of the press and moving the working area forward to give 8 in. more clearance to manipulate work in and out of the die.

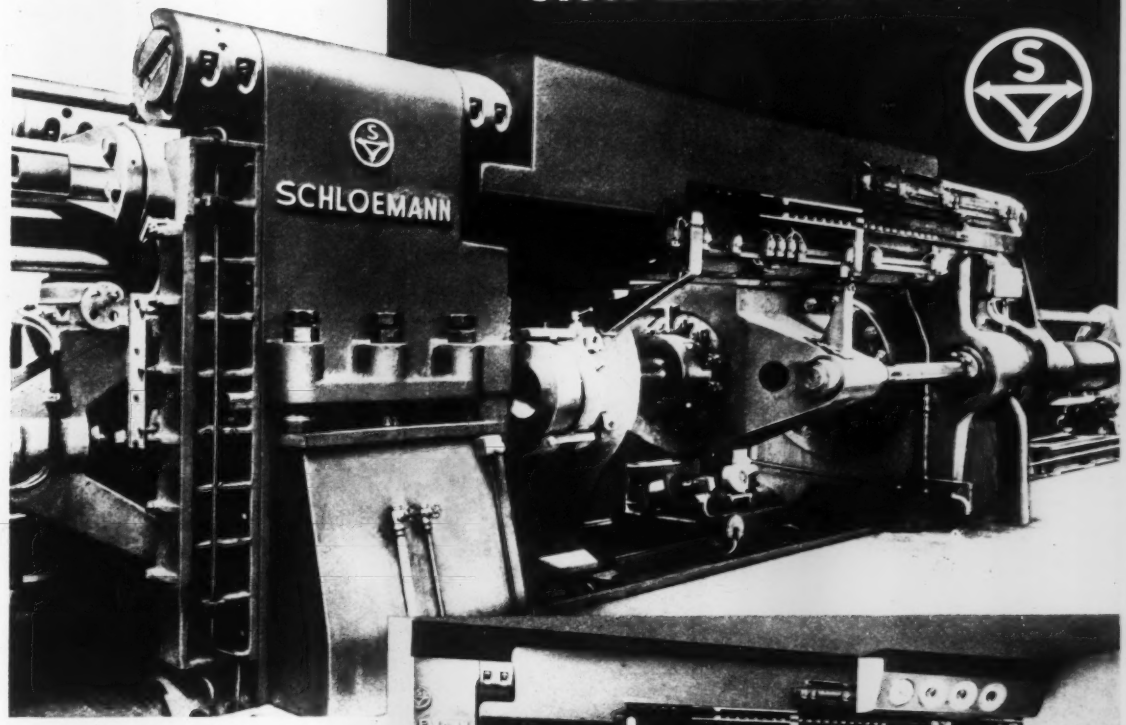
Height of the press was decreased by use of a scotch yoke (sliding block) to transmit pressure from the eccentric shaft to the ram, eliminating the pitman and ram pin. Ram guiding was improved by installing auxiliary guides at the bottom of the stroke.

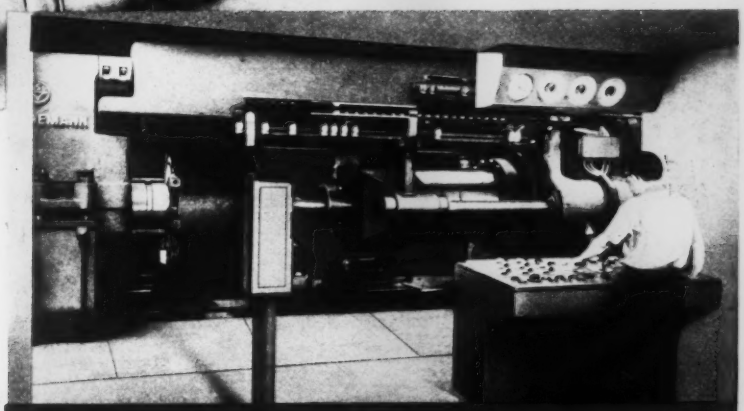
The air operated, two plate clutch is on the main shaft, within the main gear. The cover, piston, and springs can be removed as a unit. The band brake is adjustable from the floor, has a bolted-in lining, and is hinged and reversible. An air-operated brake shoe slows down the flywheel when shutting down the press.

Automation—To satisfy requirements of an automated forge shop, Erie engineers are designing a loading and unloading mechanism for the press line.

SCHLOEMANN

Steel Extrusion Press



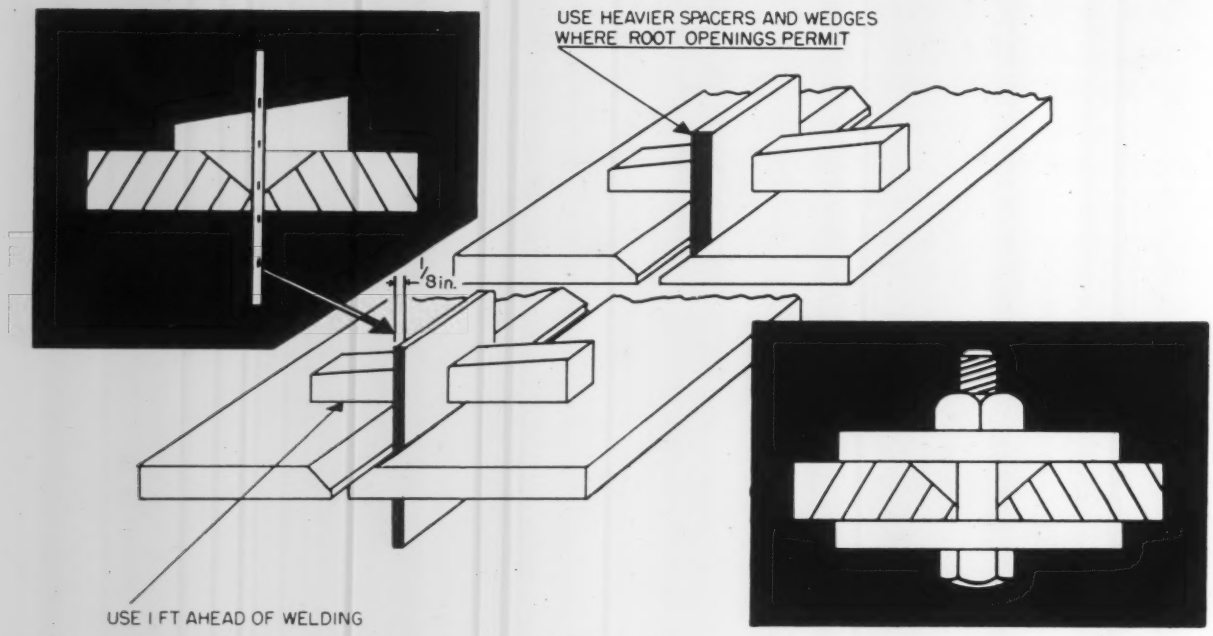


The first to be operated in Germany

The illustrations show essential features of this 2,000 ton press of completely novel design: Overhead guide-ways for moving crosshead and billet container, double swivelling arm for die and butt-end with dummy block. The advantages of these innovations and other features of the press, which, when controlled automatically can attain an hourly production of 10 tons, are described in leaflet 21h/1e.

FELLER ENGINEERING COMPANY 1163 Empire Building, Pittsburgh 22, Pa.

HOT AND COLD ROLLING MILLS • COUNTERBLOW HAMMERS • HYDRAULIC PRESSES



Uniform spacing eliminates many warping problems and cuts welding time. Two spacing devices are shown

How To Weld Copper and Its Alloys

The carbon arc is fast and generates intense heat in a narrow zone. Oxyacetylene produces welds with good ductility and strength. Here are the rules and techniques for each

By LESTER F. SPENCER
Metallurgist
West Allis, Wis.

PART THREE

THE carbon arc is a good choice for joining oxygen bearing copper and many hot short alloys. Its speed (between 10 and 20 ipm) and high rate of heat input confine the heat within a narrow zone.

Choose a long arc length for phosphorous bronze (RCuSn) filler rods and a short arc for silicon bronze (RCuSiA, RCuSiB) filler rods.

Some alloys require the application of fluxes prior to welding for a wetting action. They increase fluidity of the deposit and make refractory oxides harmless.

Electrodes — Pointed carbons (5/32 to 1/2 in.) are used. To get maximum life, use the largest diameter that can be kept sharp. For normal conditions, grip the carbon about 3 in. from the arc. If that is too long, you'll get excessive burning of the carbon. Use straight polarity: A black, sooty smudge covers the work when the wrong polarity is used, and the joint won't fuse properly.

The carbon arc also welds tough pitch copper. Be sure to use phosphor bronze filler rods. They permit high progression rates which reduce the time-temperature effect. One pass welding without a preheat is generally used. Thickness is limited to about 3/8 in.

You get satisfactory strength with the method, but the ductility of the joint may be erratic due to an eutectic. Use the single V-groove (see table, Page 111).

Technique—In applying the carbon arc method to other joint designs, try for a minimum of fusion. An excessive amount causes substantial dilution of the weld with base metal and considerable porosity from volatile oxides. Use a carbon rod the same size or larger than the welding rod. Don't use a flux or more than one pass. The flat position is preferred.

Deoxidized Copper — You can weld this metal more easily than pitch copper and get more uniform results.

Since speed affects only density, use silicon bronze electrodes. They withstand high welding heat and are easy to control. They're not as fast or as fluid as phosphor bronze rods. They enable you to use a multipass technique. Apply a flux designed for copper-silicon welding rods; use backing bars and the downhand welding position.

Some Drawbacks—You can use phosphor bronze welding rods but not for multipass welding. Copper thickness is limited to 3/8 in. Ductility isn't sufficient for much cold working. Higher fluidity causes the weld metal to cold lap in the heavier gages of copper.

To minimize that, tilt the work 7 to 15 degrees and weld slightly uphill. It will keep the weld metal from flowing ahead of the arc. No flux is needed. Use a downhand position and the same joint preparation as that for a copper silicon rod.

Welding Method — Try striking the arc on the filler rod and maintaining it on the filler metal. A moderate preheat facilitates fusion of base metal at the starting point. Once started, maintain an even progression rate, keeping the stoppage points at a minimum. It avoids craters which crack.

You can reduce shrinkage and contraction, and eliminate cracking in such craters by reducing their size. Anticipate a stoppage by gradually increasing the progression rate. Continue it until you get a cold weld, then remove all traces of cold welding or start at some point which insures proper refusion.

Brass—You can weld the high copper-zinc alloys, (usually called low brasses) with a copper-silicon rod (RCuSiA, RCuSiB). Phosphor bronze rods are also successful, but you can't cold work the joint, and they are limited to single-pass welding. (Copper-silicon bronze rods can be used for multipass procedures.) Hold fuming to a minimum by maintaining the arc on the filler rod; use preheating and reduce the current.

Low Copper-Zinc—Such alloys require a copper-silicon bronze or a low-fuming bronze rod. Copper-silicon bronze is easier to handle and makes more ductile welds. Due to the higher zinc content, there are fumes which must be removed.

You must use a preheat (not over 400° F) to obtain proper fusion and sound weld metal. Bevel 45 degrees all gages thicker than 1/8 in. to minimize disturbance of the base metal. Use multipass welding for thicknesses over 3/16 in. Take care to chip out all crater cracks—it's particularly important when you use low fuming bronze rods. After the work is hot, use an alcohol-paste or a dry flux.

Silicon Bronze—Many shops use the carbon arc to weld silicon bronze alloys. Its ease and economy make it suitable for many applications which don't require maximum physical properties within the joint. Graphite electrodes are

Carbon Arc Welding

TOUGH PITCH COPPER (phosphor bronze rod)

Thickness Base Metal (In.)	Type of Joint	Bevel* Angle (Degrees)	Root Space (In.)	No. of Layers	—Filler Rod— Diam. (In.)	Lb/ft of Seam	Electrode Diam. (In.)	Amperes**	Volts**
1/8	Square Butt	..	..	1	1/8	0.0453	1/4	140-160	30-35
1/8	Square Butt	..	3/32	1	1/8	0.1023	5/32	220-240	35-40
3/16	Single V	45	1/16	1	1/16	0.2833	5/32	300-320	45-50
1/4	Single V	45	1/8	1	5/32	0.4086	1/2	480-520	50-55

*Edges without root face.
**Guide only. Data taken with copper backer, no clamping. Weld speed will be about 15 ipm.

DEOXIDIZED COPPER (silicon bronze rod)

Thickness Base Metal (In.)	Type of Joint	Bevel Angle (Degrees)	Root Face (In.)	No. of Layers	—Filler Rod— Diam. (In.)	Lb/ft of Seam	Electrode Diam. (In.)	Amperes**	Volts**
1/8	Square Butt	..	..	1	1/8	0.0453	1/4	120-140	20-25
1/8	Square Butt	..	..	1	1/8	0.1023	5/32	200-220	30-35
3/16	Single V	45	1/16	1	1/4	0.1818	5/16	260-300	35-40
1/4	Single V	45	1/16	1	1/16	0.2833	1/2	400-440	40-45
3/16	Single V	45	1/8	1	5/16	0.4086	1/2	420-460	45-50

**Guide only. Data taken with copper backer, no clamping. Weld speed about 10 ipm.

RED BRASS (high silicon bronze rod)

Thickness Base Metal (In.)	Miter (Degrees)	Root Aperture (In.)	Size (In.)	Carbon Diam. (In.)	——Closed Circuit—— Amps.	Volts
1/8	..	3/32	1/16	1/16	180-220	30-35
3/16	45	1/16	5/32	1/4	150-190	25-30
			1/16	1/16	180-220	30-35
1/4	45	1/16	1/16	1/16	170-210	30-35
			1/4	5/16	200-260	30-35
5/16	45	3/32	1/16	5/16	180-220	28-30
			1/4	5/16	200-260	30-35
			1/4	1/2	240-300	30-35
1/2	45	3/32	1/16	5/16	200-220	28-30
			1/4	5/16	240-260	30-33
			1/4	1/2	300-320	33-35
			1/16*	1/2	300-320	33-35
			1/4	1/2	320-340	33-35

*Use parallel beads to minimize heat effect on base metal.

SILICON BRONZE

Metal Thickness (In.)	Edges (Degrees)	Bead Number	Filler Rod Diam. (In.)	Welding Current (Amperes)
1/8	Square	1	1/8	120
1/4	Square	1	5/32	130
3/32	Square	1	1/16	150
1/8	45 Bevel- Single V	1,2	5/32	120
1/4	45 Bevel- Single V	1	5/32	120
		2,3	1/16	120
5/16	30 Bevel- Single V	1	5/32	120
		2	1/16	130
		3	1/4	140
1/2	30 Bevel- Single V	1	5/32	120
		2	1/16	120
		3	1/4	140
		4	1/4	160
5/8	30 Bevel- Single or Double V	1	5/32	120
		2	1/16	120
		3	1/4	140
		4	1/4	150
		5,6	1/4	160
3/4	30 Bevel- Single or Double V	1	5/32	120
		2	1/16	120
		3	1/4	140
		4	1/4	150
		5,6,7	1/4	160

ALUMINUM BRONZE

Carbon Electrode Diam. (In.)	Welding Rod Diam. (In.)	Current (Amperes)
5/32	3/32, 1/16, 5/32	60-80
1/4	5/32, 1/16	80-130
5/16	1/16, 1/4	130-250
1/2	1/4, 5/16	250-350
3/4	5/16, 3/8	350-500
1	3/8, 1/2	500-700

Oxyacetylene Welding

COPPER (flat position, forehand)

Plate Thickness (In.)	Type Joint	Bevel Angle (Degrees)	Root Face (In.)	Root* Space (In.)	Inclination — Degrees	Inclination — In. ft	No.** Layers	Filler Rod — Diam. (In.)	Filler Rod — Lb/ft required (Approx.)
1/8	Square Butt	..	..	1/16	15-18	3 1/4-3 7/8	2	1/8	0.169
1/16	Square Butt	..	..	1/16-1/8	15-18	3 1/4-3 7/8	2	5/32	0.317
1/4	Single V	45	1/16-3/32	1/8	15-18	3 1/4-3 7/8	2	1/8	0.453
5/16	Single V	45	3/32-1/8	1/8	15-18	3 1/4-3 7/8	2	1/4	0.908
1/2	Single V	45	1/8-3/32	1/8	15-18	3 1/4-3 7/8	3	1/8	1.449
5/8	Single V	45	1/8-3/32	1/8	15-18	3 1/4-3 7/8	3	1/8	2.292
3/4	Single V	45	1/8-1/16	1/8	15-18	3 1/4-3 7/8	3 or 4	1/8	3.078

COPPER (flat position, backhand)

1/8	Square Butt	..	..	1/16	10-12	2-2 1/2	2	1/8	0.169
3/16	Square Butt	..	..	1/16-1/8	10-12	2-2 1/2	2	5/32	0.317
1/4	Single V	30	1/16-3/32	1/8	10-12	2-2 1/2	2	5/32	0.376
5/16	Single V	30	3/32-1/8	1/8	10-12	2-2 1/2	2	1/4	0.684
1/2	Single V	30	1/8-3/32	1/8	10-12	2-2 1/2	2	1/4	1.007
5/8	Single V	30	1/8-3/32	1/8	10-12	2-2 1/2	2	1/4	1.521
3/4	Single V	30	1/8-1/16	1/8	10-12	2-2 1/2	3	1/4	2.220

*Taper root space 1/16 in. ft to allow for metal contraction in first layer.
**Number shown includes layer on reverse side after chip-out.

SILICON BRONZE (buttwelding)

Base Metal Thickness (In.)	No. of Passes	Filler Rod Size (In.)	Spacing (In.)	Angle of Bevel (Degrees)
3/64	1	3/32	3/64	
1/16	1	1/8	3/64	
3/32	1	5/32	1/16	
1/8	1	3/16	1/16	
5/32	1	3/16	1/16	
3/16	1	3/16	1/16	
1/4	1	3/16	1/16	45, Single
3/8	1	5/16	1/16	45, Single
1/2	1	1/4	1/16	45, Single
	2	5/16		
5/8	1	1/4	1/16	45, Single
	2	5/16		
	3	5/16		
3/4	1	1/4	1/16	45, Single
	2	5/16		
	3	3/8		
3/4	1	3/16	1/16	45, Double
	2	5/16		
	1	3/8		

superior to the carbon type. Use straight polarity direct current, filler metal of the same composition as the base metal, and an alcohol-paste fluxing agent. Arc lengths of 1/8 to 3/16 in. give best results. (See table, Page 111.)

If you use multipass welding procedures, chip the slag from the deposited layer before continuing succeeding layers. For the first pass you get best results with a small filler rod, low heat, and a minimum number of stops. Start succeeding layers about 2 or 3 in. from the edge. After finishing a layer, return to that point and weld back to the edge. That permits sufficient cooling to prevent cracking during subsequent welding.

Aluminum Bronze—Here is an alloy that's hard to weld. It forms refractory slags which require careful control to prevent inclusions.

In carbon arc welding, flux coated aluminum bronze filler rods (RCuAl-Al, RCuAl-A2, RCuAl-B) have enough fluxing action to obtain a sound weld. (Variables like electrode diameter, rod diameter, and current values are shown in the table, Page 111.) High aluminum grades (Rockwell Hardness B90 or over) need a preheat between 700 and 800° F. The lower ones need only 400° F. In addition, the high aluminum grades require a post-heating at about 1150° F.

In groovewelding, hold the graphite electrode at about 15 degrees to the horizontal. Arc length should be about equal to the diameter of the welding rod. Remove slag between passes. A weaving motion evenly distributes the intense heat of the arc.

Beryllium Copper—These alloys have a refractory oxide, so use coated electrodes of similar base analysis. Those bearing some nickel work better than those with cobalt—you get maximum mechanical properties after heat treatment. Preheat and interpass temperatures of 600 to 700° F help produce a smooth weld and prevent undercutting. (In service, beryllium copper is heated to 1450° F, held about 1 hour per inch of thickness, water quenched and tempered at about 600° F.)

Don't weld phosphor bronze with a carbon arc.

Oxyacetylene

You can weld silicon bronze with oxyacetylene although the inert gas, metal arc method is preferred. Use an RCuSiA or RCuSiB filler rod, a high boric acid flux, and a slightly oxidizing flame during welding.

You get excellent ductility and strength values with oxyacetylene. Its welds have a viscous film covering the molten metal—it helps in overhead and vertical welding.

Keep the weld pool as small as you can. You get rapid solidification, maintain a small grain size, and avoid contraction strains during the cooling phase. Backing bars are usually not required.

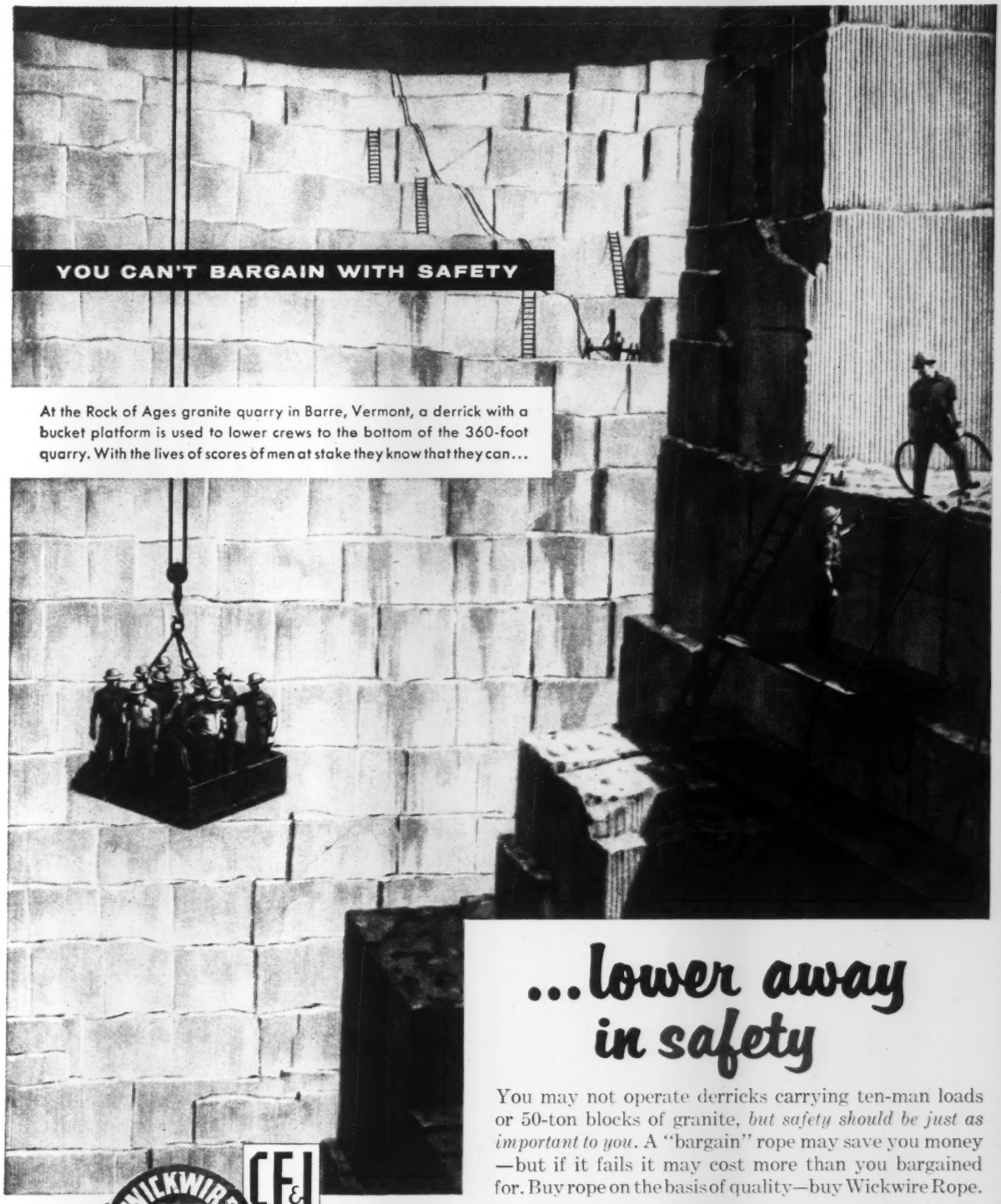
Nickel Silver—These alloys require a liberal application of flux to wash away the refractory nickel oxide. The filler rod (RCuZnD) has up to 10 per cent nickel. Weld deposits are almost white.

The cupro-nickel alloys, which have more nickel than nickel silvers, require an exceptionally active flux to eliminate refractory nickel oxide slag. (The usual one is like that used for Monel metal.)

The filler rod (RCuNi) is similar to the base metal. It contains enough deoxidizer, usually manganese or silicon, to protect the metal.

Use a slightly reducing flame. Try to get the weld deposit to solidify rapidly. Don't agitate the weld.

You can weld deoxidized copper with an RCu electrode and be sure that joint strength will equal the annealed strength of the base metal (30,000 to 35,000 psi). The main objection to the rod: Weld metal is too fluid. It has a fast lineal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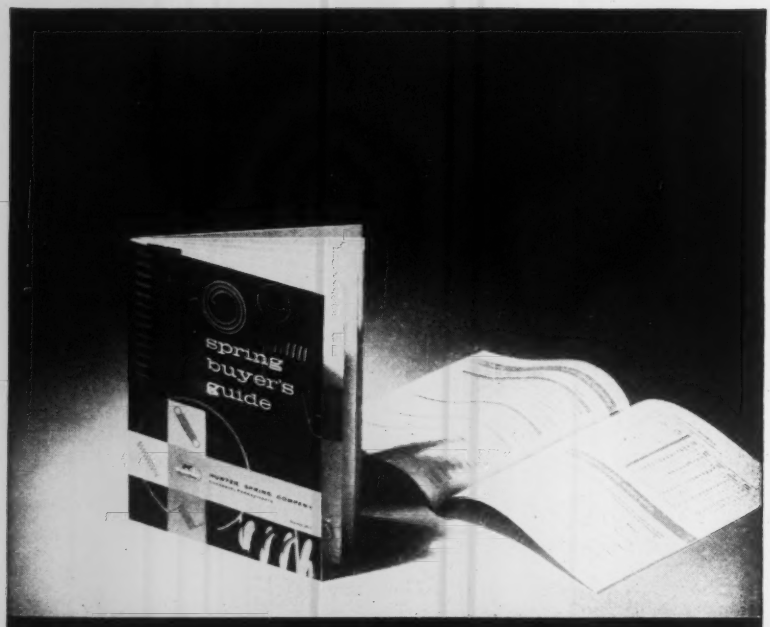

* subjects

- Spring Terminology
- Typical Spring Buying Headaches
- How to Avoid Spring Buying Headaches
- Recording Special Quality Standards
- How Springs Are Priced and Quoted
- Analyzing Quotations
- Refusals to Quote
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welding speed, but for thicknesses over 3/16 in., you must avoid getting a braze rather than a weld.

You won't have trouble welding in the flat position if you preheat the copper. When weld temperature is controlled to minimize loss of filler metal, you may run into some cold welding in the root of the V-joint. Chip out and reweld from the reverse side to insure adequate fusion and bonding.

Stress Raisers — You can easily compensate for natural contraction in the first pass of a longitudinal seam by using a tapered root space. Subsequent passes make for rigid joints. To minimize stress, start them about 6 to 15 in. from the end of the seam. From that point you can weld in either direction. Hot peening isn't practical.

Tackwelding to maintain alignment is all right, but wedge or bolt clamps (illustration, Page 110) are better for long seams. They eliminate the interruption caused by melting the tackwelds. As the welding proceeds, remove clamps.

To minimize oxidation, paint an area 2 to 4 in. wide on both surfaces with a water paste flux. Use a neutral flame and choose torch tips large enough to weld at least 2 ipm. For heavier work, preheat to 800° F with a second torch.

Heat Input—It's important that you use adequate heat. Copper is highly conductive, and the filler metal extremely fluid. An experienced welder can judge that factor. Here are some difficulties caused by inadequate heat: Volatilization, oxidation, and porosity.

Too much heat forces you to weld rapidly, and you lose control. Excessive fusion of the base metal leads to loss of filler metal.

Special Technique—Here is a way to weld longitudinal seams in relatively heavy sections (1/2 to 5/8 in. thick). The weldment is placed with the seam vertical. Two operators weld both sides simultaneously. That shortens welding time and conserves preheating. The operators alternate welding: While one operator welds, the other preheats.

The technique is developed only with practice. Cost should be lower than that for multilayer welding of single V-groove joints.

You minimize shrinkage effects

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with the technique by maintaining small amounts of filler metal in the liquid condition. The single heating cycle minimizes time-temperature and atmosphere effects on the base metal, and it eliminates rigid joints. Since they react as a single layer, you can hot peen double weld joints more easily.

Brasses—The procedure for red brass demonstrates the best oxyacetylene technique for low brasses.

Weld in all positions with a silicon bronze rod (RCuSiA and RCuSiB). The rod increases corrosion resistance.

You can weld the high brasses (cartridge brass, yellow brass, Muntz metal, naval brass and manganese bronze) with oxyacetylene. Use a filler rod which is similar to the base metal (AWS-ASTM RCuZnA, RCuZnB, and RCuZnC). Use preheating and fluxing—it's essential to avoid the volatilization of zinc. Expect some trouble with alloys containing more than 0.5 per cent lead—it tends to boil out, creating unfavorable welding conditions and sometimes porosity. Weld continuously. Hold the rod continuously in the flame envelope.

Not Recommended—These metals should not be welded with oxyacetylene: 1. Tough pitch copper. 2. Phosphor bronze. 3. Aluminum bronze. 4. Beryllium copper.

The copper-cuprous oxide eutectic in tough pitch copper accumulates at the grain boundaries at about 1680° F. The amount of segregation depends on welding time and temperature, and contributes, at least partially, to inferior welds, especially in heavier gages. You can weld thinner gages if you don't want high joint strengths.

Phosphor bronze is hot short. Oxyacetylene leaves the weld porous and cracked. Keep the heat zone as narrow as you can to promote quick solidification. It's usually done with standard phosphor bronze rods, a good brazing flux, and a neutral flame.

The oxide film on aluminum bronzes and beryllium copper is tough to handle with standard copper fluxes.

• *An extra copy of this five-part article is available until supply is exhausted. Parts I and II appeared in preceding issues. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

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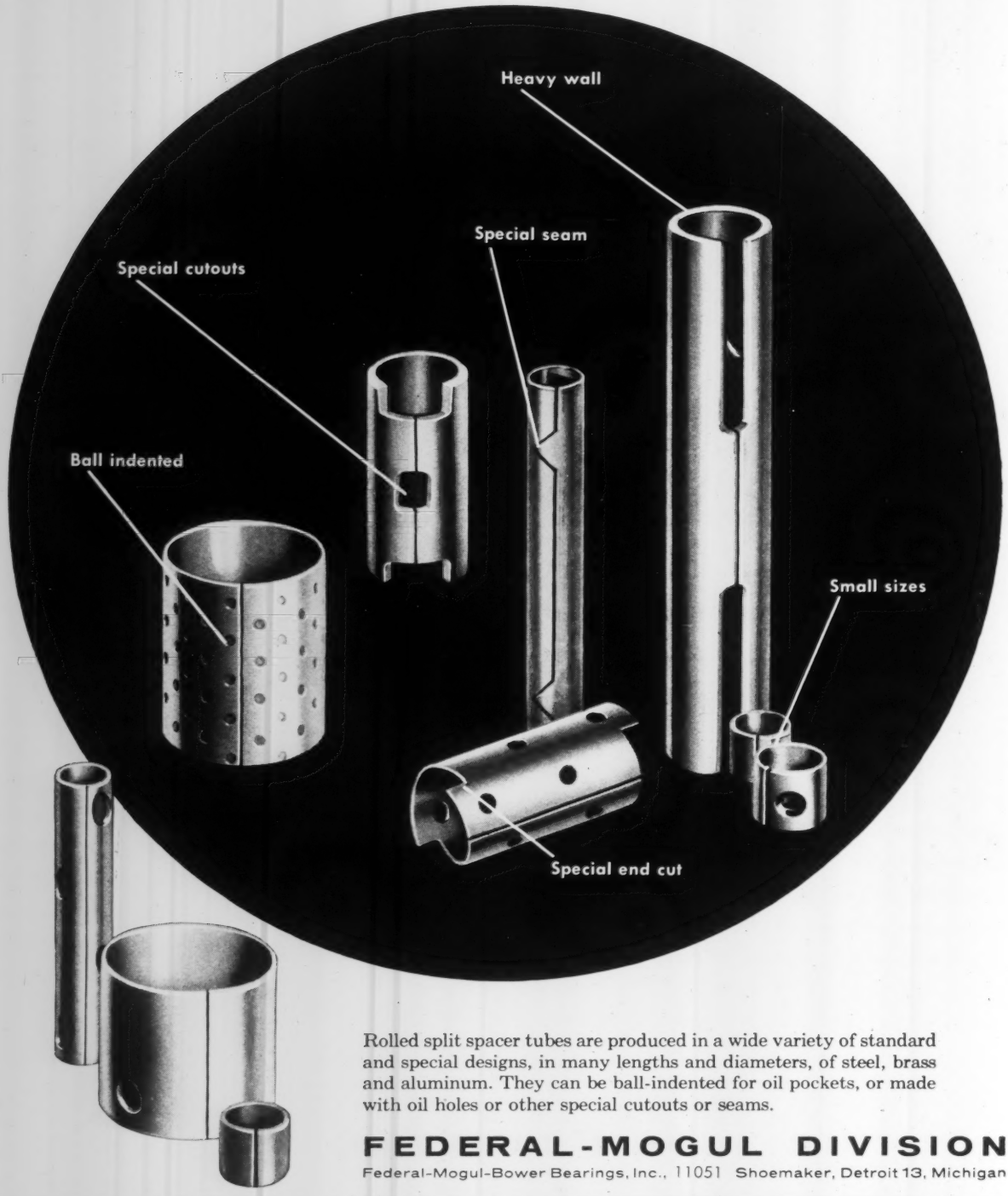

Rolled split spacer tubes are produced in a wide variety of standard and special designs, in many lengths and diameters, of steel, brass and aluminum. They can be ball-indented for oil pockets, or made with oil holes or other special cutouts or seams.

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Federal-Mogul-Bower Bearings, Inc., 11051 Shoemaker, Detroit 13, Michigan

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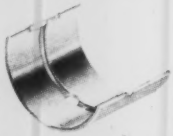
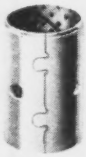


Engine Bearings



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This type automatic riveter consists of several individual basic machines, each mounted on a base and equipped for air operation. The number of heads, the type of rivets, and the distance between centers and anvil elevations are determined by the assembly for which they are designed. They may be altered to meet changing requirements.

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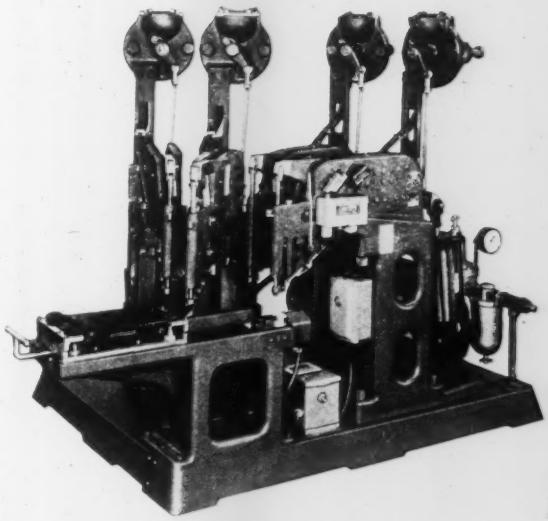
Units often set identical rivets but, by the changing of feeding parts, up to 12 different types of rivets can be fed at the same time.

Body diameter ranges for the rivets used are from 1/16 to 3/16 in. Lengths range from 3/32 to 1 in. *Write*: Tubular Rivet & Stud Co., Quincy 70, Mass. *Phone*: President 3-1776



35-Ton Power Press Brakes Have Variable Speed Drive

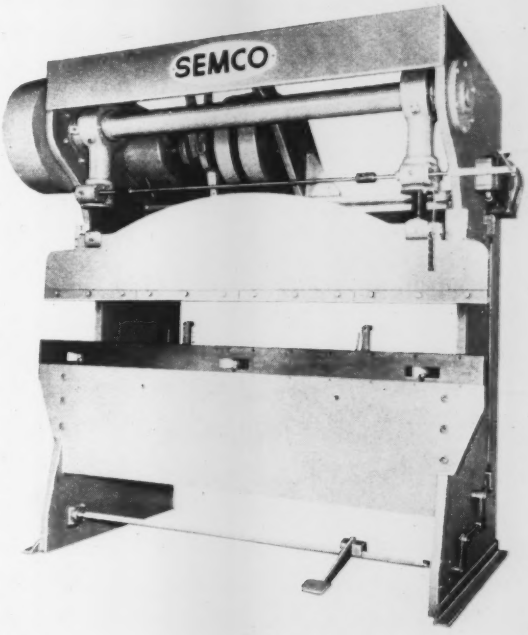
Model 635 has a bending capacity of 6 ft for 12 gage sheet steel. Model 835's capacity is 8 ft for 14 gage. They are of welded steel construction. All movable parts have ball or roller bearings with one exception. Alloy bronze bearings protect the alloyed steel forged, heat treated, and balanced eccentric crankshaft.

The frame weldment includes the one-piece lower bed which is machined after fabrication, including a ½ by ⅞ in. slot in exact alignment with the ram, allowing accurate setting of large dies when the press is used with the die holder removed. A treadle operating on a ball bearing shaft is adjustable to any position, maintaining uniform action at any point of the bed.

The brake is powered by a 3 hp, 1750 rpm motor and runs at 40 strokes a minute. Stroke is 2 in. with a 4½-in. adjustment. The over-all shut height is 8 in. with the die holder in and 12½ in. with it removed.

Depth of throat from center line of bed and ram is 6½ in. and the distance from the floor to throat bottom is 30½ in. Over-all height is 79 in.

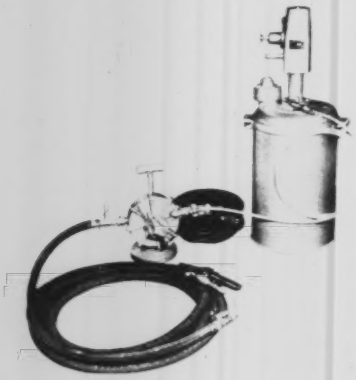
Both models are standard with motor, electrical controls, die holder, and standard back gages. *Write*: Service Machine Co., 154 Miller St., Elizabeth 3, N. J. *Phone*: Elizabeth 3-5088



NEW PRODUCTS and equipment

Airless Paint Spray

This spray unit operates on a hydraulic atomization principle, is compact and portable. Overspray is held to a minimum. A controller and explosionproof heated



hose assembly are part of this unit. *Write*: Spee-Flo Co., 720 Polk, Houston, Tex. *Phone*: Capitol 5-0461

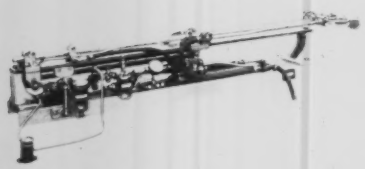
Hydraulic Diecasting

This 1000-ton machine for making aluminum diecastings (up to 25 lb) has a 67 by 67 in. die plate. The injection cylinder has a 4 in. diameter and 30 in. stroke. Floor space required is about 113 by 313 in. Over-all height is 106 in. and net weight is 85,000 lb. *Write*: Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio. *Phone*: Redwood 1-5300

Reciprocating Sprayer

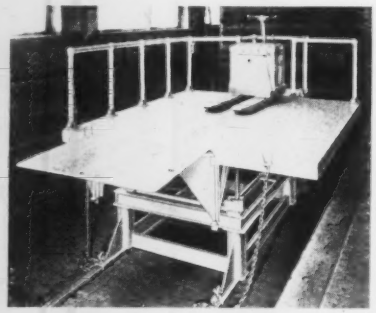
From one to five spray nozzles mounted on an automatically triggered arm of this device will plunge in and out of position at high speed, spray in almost any volume, pattern, and force at one or more points or portions of its outward or return stroke, or both.

Moto-Spray automatically repeats its operation when actuated by any mechanical or electrical device, or can be actuated manually. *Write*: Renite Co., Columbus 1, Ohio. *Phone*: Axminster 4-4709



Elevator, Loading Dock

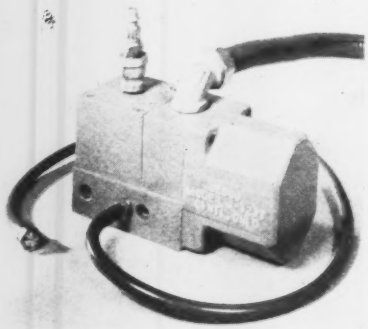
Portelvator is a portable elevator and variable height loading dock. It maintains a constant level with truck beds for safe and speedy use of fork trucks. If wished, the unit may be handled and moved with an overhead crane. The platform is 10 by 12 ft, exclusive of extensions which form a bridge between platform and truck.



The load capacity is 10 tons, lift speed is 13 ipm. Power is furnished by a 5-hp crane hoist motor. *Write*: Hamilton Tool Co., 848 S. Ninth St., Hamilton, Ohio. *Phone*: Twinbrook 5-4351

Proximity Transducer

Proxi-Tran is a pneumatic proximity transducer which provides an electrical signal when a part nears the pickup nozzle. Power input is factory air at 70 to 120 psi. The pneumatic output is fed to a pressure switch which will handle 110 to 230 volts alternating current at 15 amperes or 110 volts direct current at 5 amperes.



Units are well suited for signaling workpiece locations and actuating machine cycling. *Write*: Jessup Engineering & Development Co., 4289 Glendale-Milford Rd., Cincinnati 42, Ohio. *Phone*: Tweed 1-3740

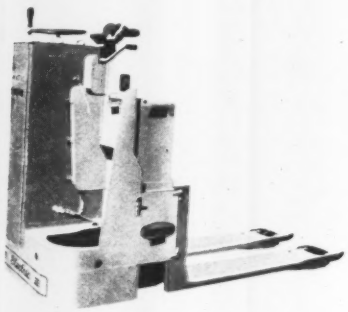
Plating Rectifiers

As replacements for older equipment, silicon plating rectifiers are reported to cut costs by 30 per cent, since they require less maintenance and power. Original cost also is under some other types. *Write*: Equipment Div., Wagner Bros. Inc., 7800 Dix Rd., Detroit, Mich. *Phone*: Tulsa 3-0100

Rider Pallet Truck

This truck is manufactured in 2 and 3 ton capacities. It features simultaneous steering of both wheels (controlled castered) and a center pivoting feature which compensates for uneven load distribution.

The Transveyor is 32 in. wide and its 9-in. forks are available in lengths from 30 to 60 in. with wheel bases from 44 to 74 in. With a 48 by 42 in. pallet, it can stack in a 78-



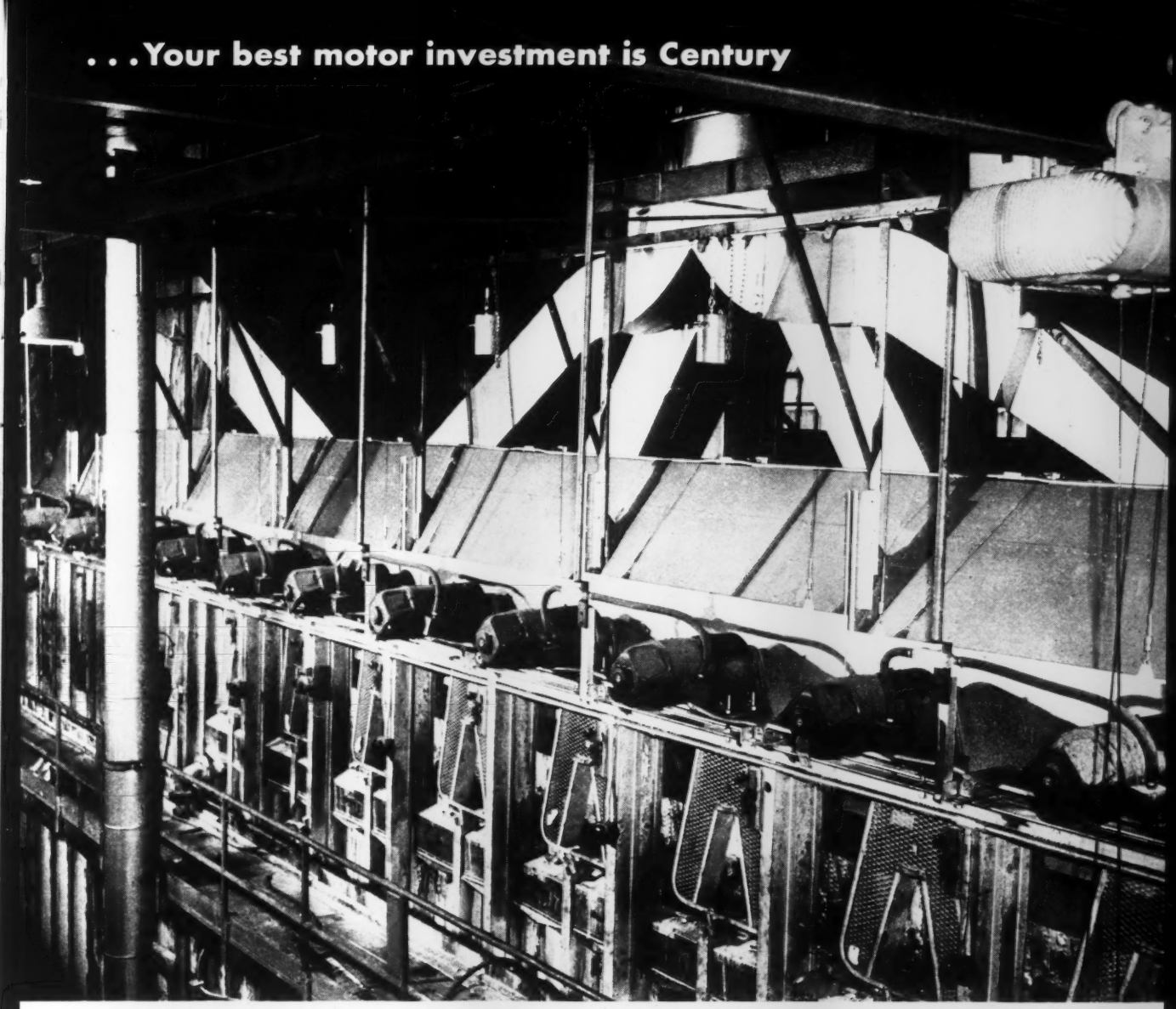
in. wide aisle and make a right angle turn in 65 in. *Write*: Automatic Transportation Co. Div., Yale & Towne Mfg. Co., 149 W. 87th St., Chicago, Ill. *Phone*: Radcliffe 3-7000

Fork Trucks

This 1-ton capacity, electric fork truck (EC-20) features carbon pile drive control which provides smooth acceleration from stop to full speed. Batteries may be removed from either side or the top of the unit. Self-adjusting brake shoes eliminate brake adjusting.

Lift speed, loaded, is 50 ft per

. . . Your best motor investment is Century



For flexible control of motor power — DC motors by Century

Direct current motors are the only way to solve certain drive problems. For example, in the case of multiple motor drives, only DC motors have the flexibility required to do the job right. Century manufactures a line of top quality DC motors which meet the growing need in industry for this kind of "controlled power."

Century DC motors give you the precise speed control needed to handle infinite variations in production and processing. And you can draw on Century's more than fifty years of experience in DC motor applications.

The line of top quality DC motors is only one of the reasons why your best motor investment is Century. Call your local Century man or Authorized Century Distributor about your specific motor applications.

Century MOTORS

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri • *Offices and Stock Points in Principal Cities*

NEW PRODUCTS and equipment

minute; it has a turning radius of 62 in., and will travel up to 6½ mph forward or reverse. *Write*: Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich. *Phone*: Woodward 2-6561

Turntable

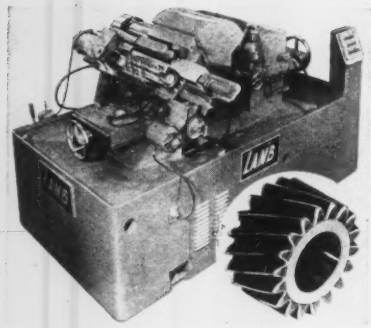
This unit will handle loads weighing up to 10,000 lb. It is supported by six heavy duty casters. The underside of the table has a turned raceway to permit easy rotation of the deck.

Spring loaded stops can be used at 90 and 180 degree points. *Write*: Sage Equipment Co. Inc., 30 Essex St., Buffalo 13, N. Y. *Phone*: Elmwood 5242

Gear Tooth Grinder

Production rate of this unit is limited only by the diameter of the gear. It will deburr and chamfer hardened gear teeth at the rate of 900 to 2100 gears an hour. A unique method of handling and feeding parts accounts for the high rate.

Machine operation is continuous and fully automatic. Work loading



and ejection features are designed for complete adaptability to automated part handling systems. *Write*: F. Jos. Lamb Co., 5663 E. Nine Mile Rd., Detroit 34, Mich. *Phone*: Jefferson 6-3535

Bar Feed

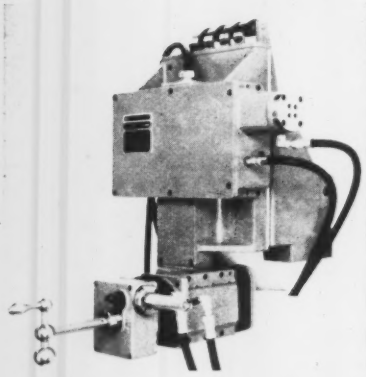
This automatic loading bar feed may be used with any machine having a collet, chuck, or jaws permitting stock to be fed to a predetermined stop. A positive pressure circuit alerts systems and controls to work with high speed machines.

A multicontrolled swing stop permits variations in piece length from 3/16 in. to full length capacity of machine. *Write*: Lipe-Rollaway Corp., Syracuse, N. Y. *Phone*: Hunter 8-5411

Contour Wheel Dressers

Models 93 and 95 are hydraulically operated units for both right and lefthand installations on cylindrical grinders. They are designed primarily for multiple-wheel grinders and for grinding applications which cannot be handled by single-spindle grinders.

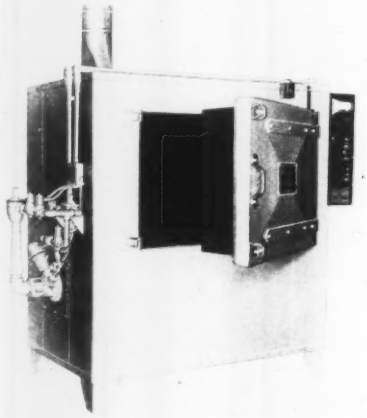
Units are applicable to wheels 2½ in. wide and 2 in. deep. *Write*:



Hoglund Engineering & Mfg. Co., Berkeley Heights, N. J. *Phone*: Crestview 3-7183

Furnace

Designed for solution heat treating, this line of 1000° F recirculating furnaces is available for electric or gas heat. Work chambers are 38 by 20 by 26 in. high. Overall dimensions are 56 by 32 by 63 in. It has a 150,000 Btu gas burner. A ¾-hp motor drives the recirculating blower.



Standard units are available in both larger and smaller sizes than the one shown. All models have stainless steel interior cabinets and blowers for high temperature operation. *Write*: Grieve-Hendry Co. Inc., 1401 W. Carroll Ave., Chicago 7, Ill. *Phone*: Taylor 9-0200

Molds

Master-Molds allow use of the same core mold in the production of several similar items in sequence. Use of one core mold and several cavity molds permits changes from production of one item to another in less than 20 minutes.

The master molds do not have to be removed from the machine during change. *Write*: Richards Tool & Mold Co., Racine, Wis. *Phone*: Melrose 3-7651

Holding Furnace

This GB electric resistance holding furnace is made in four capacity sizes from 500 to 2000 lb. They are fabricated from steel and incorporate standard refractories. The resistance units are placed in a

Giant
126-ton crankshaft
checked for
soundness
by...

ULTRASONIC TESTING

This huge crankshaft is vital to the operation of a steel plant blooming mill. Its importance cannot be overstated. Failure of the shaft under the tremendous stresses involved would wreck the 25,000 hp steam engine that drives it, and cripple production for the plant.

Dangerous internal defects must not be permitted to develop and early detection is essential. Ultrasonic inspection does the job efficiently, accurately and with the greatest reliability, giving the plant high assurance on the safety factor of this costly equipment.

REFLECTOSCOPE CUTS REJECTS IN AUTOMOTIVE TRANSMISSION SHAFT PRODUCTION

Of smaller size, but equally important, is the ultrasonic inspection of automotive transmission shaft forgings. Sperry Reflectoscopes locate hidden flaws at an early production stage, preventing costly rejects and minimizing the potential dangers of failure in customer use.

An invaluable inspection tool, the Reflectoscope has thousands of applications, ranging through quality control, periodic maintenance, laboratory testing, automatic inspection on high-speed production lines, etc. Equally efficient in contact or immersion use, it provides a quick and economical technique for detecting hidden flaws.

If you're interested in saving man-hours and material, send today for details of the Sperry Ultrasonic Reflectoscope. Just fill out and mail the coupon.

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Danbury, Conn.
First in Ultrasonic Inspection

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Sperry Products, Inc., 903 Shelter Rock Road, Danbury, Conn.

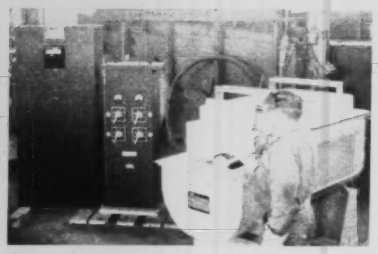
NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

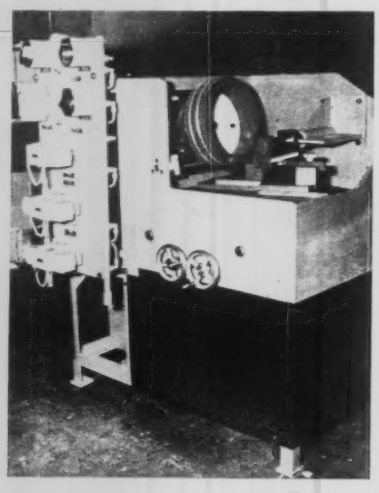
NEW PRODUCTS and equipment



removable roof for ease in maintenance. Power is variable and the unit can be used for over-the-weekend holds. *Write*: Stroman Furnace & Engineering Co., 9900 Franklin Ave., Franklin Park, Ill.

Automatic Tool Grinder

Contour-O-Matic is an automatic grinder that duplicates a given form on single-point brazed or solid carbide cutting tools. The machine



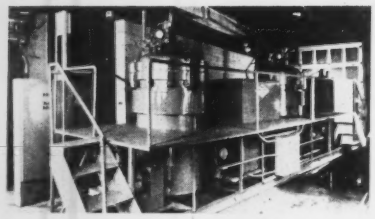
completes both rough and finish grinds in the same setup in one automatic cycle.

An attendant is required to load and unload the tools. *Write*: United Tool Co., 303 U. B. Bldg., Huntington, Ind.

Impregnation

Model P-2000 Series, twin-autoclave units are designed for economical batch impregnation of pressure castings. They're automatically controlled.

The units feature safety for both equipment and operator. They can be installed above the floor or in a pit. They are 26 by 6 by 9 ft high.



Electronic controls are mounted in a separate panel.

The units are available on a leasing plan. *Write*: Prenco Mfg. Corp., 507 E. Ten Mile Rd., Hazel Park, Mich. *Phone*: Lincoln 7-2622

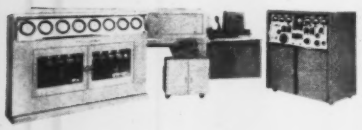
Plate Stripping

This chemically stable solution will selectively strip nickel plate from basic metals. Solution stability makes it feasible to maintain a standby bath for reclamation purposes. Masking of the basic metal parts is not required as it has little or no effect on metals other than nickel or cadmium.

It contains no cyanide or caustic, is nontoxic and reasonably safe to handle. *Write*: Hanson-Van Winkle-Munning Co. Inc., Matawan, N. J. *Phone*: Matawan 1-1000

Production Spectrograph

A direct reading attachment for a high resolution spectrograph permits this instrument to be used for production. When combined with the spectrograph, it provides fast,

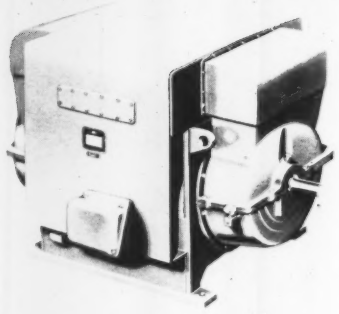


accurate analysis on samples. Per cent concentration readings of eight elements are possible in less than two minutes. *Write*: Baird-Atomic Inc., 33 University Rd., Cambridge 33, Mass. *Phone*: University 4-7420

Weatherproof Motors

This line of motors is designed for outdoor operation under extreme weather conditions. Ratings are from 250 to 1500 hp. The motor's ventilation system prevents the entrance of windborne particles and moisture.

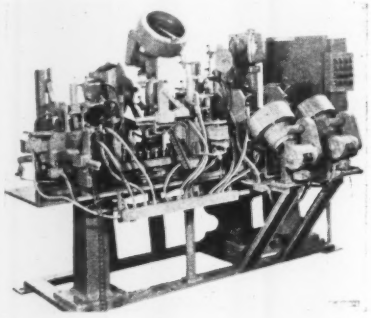
It provides reliable service in extremely high winds, driving rain,



snow, sleet, or sandstorms. *Write*: Dept. P, Louis Allis Co., 427 E. Stewart St., Milwaukee, Wis. *Phone*: Humbolt 1-6000

Assembly Machine

The design principles of this small component assembly machine are readily adaptable wherever high speed, multiple small parts assembly is required.



The unit shown assembles carburetor economizer diaphragm valves at a rate of 900 an hour.

All operations are automatic and electrically controlled. *Write*: Gray Equipment Mfg. Co., 13600 Ford Rd., Dearborn, Mich. *Phone*: Tiffany 6-7573

Hopper Feeder

These air operated, high suction units are used to transfer wet or dry materials to processing machinery. In operation, a valve closes causing the unit to fill. The unit then shuts off and holds the material until discharge is desired. Closed systems make the nonelectric units dust-free. *Write*: Vac-U-Max, 1 Montgomery St., Belleville 9, N. J. *Phone*: Humbolt 2-1000

NEW literature

Write directly to the company for a copy

Clutch Brake

Bulletin 504 describes a new miniature clutch and brake combination for use in computers, office machinery, aircraft equipment, and other applications requiring minimum torque and miniature size. Stearns Electric Corp., 120 N. Broadway, Milwaukee 2, Wis.

V-Belts

"Dixlink," section V-belts for drives from ½ to 1000 hp, are described in this booklet. R. & J. Dick Co., Box 388, Passaic, N. J.

Precision Grinders

Catalog 1-57 describes and illustrates the company's 10 in., Type H, universal precision cylindrical grinders. Landis Tool Co., Waynesboro, Pa.

Fastener Installation

Form 8-240 describes a line of standard hydraulic pull tools for fastener installation. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

Punches and Die Buttons

This catalog provides data and prices on punches and die buttons. Pivot Punch & Die Corp., North Tonawanda, N. Y.

Alloy Comparison Chart

Three leading lines of brazing alloys are cross-referenced on this chart for the buyer and user. American Brazing Alloys Co., P. O. Box 11, Pelham, N. Y.

Metal Roll Forming

Many types of roll-formed sections as well as angles, channels, molding, and tubing are illustrated and described in this brochure. Universal Molding Co., 10807 Stanford Ave., Lynwood, Calif.

Silver Solder Flux

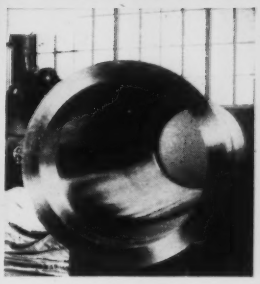
No. 601 noncorrosive flux is an 1800 to 2000° F long cycle flux. It works well on stainless steel and in the brazing of thin to thick sections where heat conductivity changes. A free sample will be sent. Superior Flux & Mfg. Co., 1536 St. Clair Ave., Cleveland 14, Ohio.

Alloys

Properties and fabrication characteristics of a complete range of special alloys for electronic, magnetic, and electrical applications are detailed in a 64-page book. Carpenter Steel Co., 339 W. Bern St., Reading, Pa.

Flame Cutting

Form ADC 706D, "56 Oxygraph Flame Cutting Machine," describes the design and performance features of this multi-torch model. Air Reduction Sales Co., a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.



You get greater strength . . . with

SHENANGO CENTRIFUGAL CASTINGS

Downtime, rejects, heavy maintenance costs and too-frequent replacements can be cut down *appreciably* by the use of Shenango extra-strong centrifugal castings.

They provide a finer, *pressure-dense* grain . . . with all the weakening defects eliminated, such as blowholes and sand inclusions.

Though built to stand the most rugged service, each Shenango casting is precisely-dimensioned to your exacting requirements. Whether you need rolls, bearings, bushings, mandrels, sleeves, liners, or any other essentially symmetrical part . . . *specify Shenango* for greater strength, greater wear-resistance, greater lasting power and greater savings, year after year.

Informative bulletins are yours for the asking. Write to: *Centrifugally Cast Products Division,* The Shenango Furnace Company, Dover, Ohio.

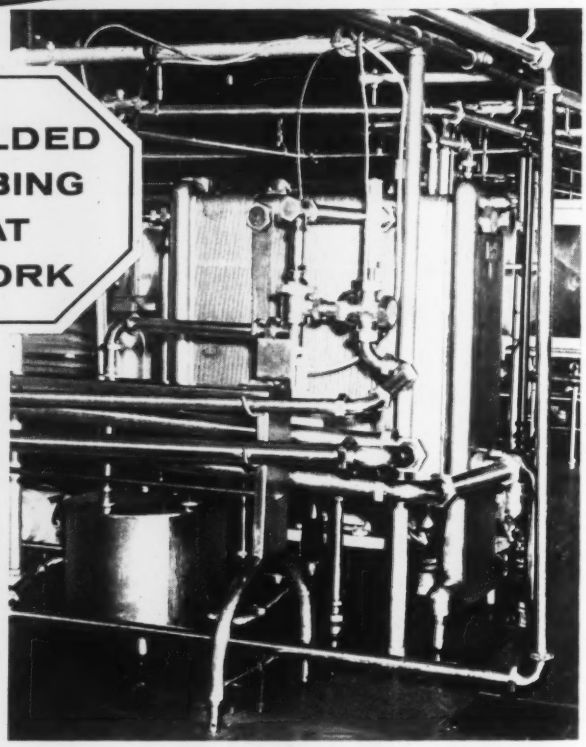
SHENANGO CENTRIFUGAL CASTINGS

COPPER, TIN, LEAD, ZINC BRONZES • ALUMINUM AND MANGANESE BRONZES
MONEL METAL • NI-RESIST • MEEHANITE METAL • ALLOY IRONS

Design with TUBING in mind!

WELDED TUBING AT WORK

Once machined from solid bar stock, this machine gun flash hider was produced at a 92% saving in cost by forming from Welded Carbon Steel Tubing.



Positive sanitation, non-contaminating, non-corrosive, non-breakable —all these call for Welded Stainless Steel Tubing in hundreds of Pasteurizers like these and all sanitary services.

Reduce fabricating costs—Insure purity

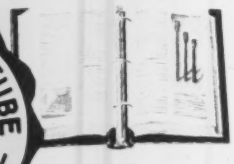
CHOOSE WELDED STEEL TUBING

Carbon · Alloy · Stainless Steel

Easy workability, outstanding uniformity, wide range of grades make Welded Tubing applicable to nearly every use requiring a hollow part. Whether a mechanical component, a structural use, to convey liquids or gases, or move at high RPM—there is a grade, size and shape of Welded Tubing that will do your job best. For all tubing applications, consult a quality tube producer.

An Association of Quality Tube Producers

FORMED STEEL TUBE INSTITUTE — FSTI



Design inspiration for you

The 260-page Handbook of Welded Steel Tubing contains inspiration and data for tubing designs. For your copy, write on your company letterhead, giving your title.

FORMED STEEL TUBE INSTITUTE
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Market Outlook

COME what may, you can expect no big reductions in steel prices. During the week ended Mar. 4, the finished steel price index of the Bureau of Labor Statistics slipped from 181.8 to 181.7, but this reflected nothing more than a cut in extra charges for special widths and thicknesses of hot-rolled strip.

PARADOX OF '58— There was no softening of the base price. STEEL's arithmetical price composite remained at $145.42 a net ton—only 77 cents below last September's prerecession level. That's almost unbelievable when you consider that the rate of steelmaking operations has plummeted 27 points since September.

CONTRAST WITH '49— During the recession of 1949, a drop of 32 points in the steelmaking rate was accompanied by a $6.22 break in STEEL's arithmetical price composite. During the recession of 1953-54, a 27-point drop in steelmaking operations resulted in a $2.36 reduction of the composite, and most of the decline came from abolition of premium prices.

LESSON OF THE PAST— To explain why 1958 prices are firm despite low level operations, you need only remember what experience has taught steelmakers: Price cutting doesn't stimulate demand for steel. If you cut your price 5 per cent in hopes of selling more, chances are you'll sell about the same tonnage and get 5 per cent less money for your trouble.

• Demand is affected by general economic conditions and by the buying mood of the public. If you cut the price of steel $5 a ton, you reduce the cost of an automobile by $7.50. Would such a reduction break the jam of dealer inventories?

• On July 1, labor costs are going up. Will steel, sixteenth among manufacturing industries in return on invested capital, risk a smaller return by cutting prices in the face of mounting costs?

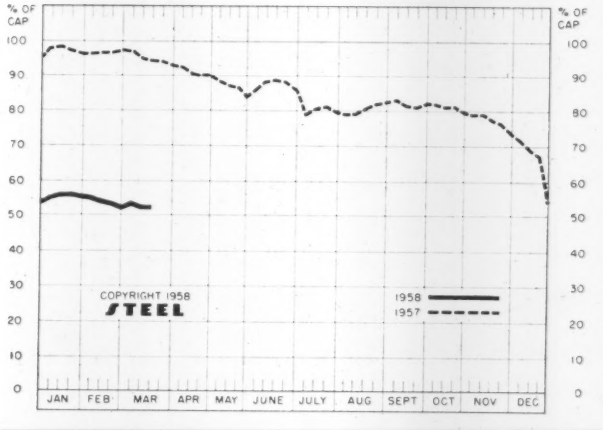
SEES HIGHER PRICES— Walter E. Watson, vice chairman of Youngstown Sheet & Tube Co., says the hourly increase in union pay will be about 7 cents, but additional fringe benefit costs will push the amount up to 20 cents. The higher costs may result in an $8-a-ton boost in steel prices, he believes.

PICKING UP?— Vanadium-Alloys Steel Co. reports it booked more orders in February than in January, more in January than in December. J. P. Gill, president, sees "evidence of improvement in the sensitive market for tool steels and related products" made by his company. Says Youngstown's Mr. Watson: "In the last two or three weeks, orders have picked up. Tonnage isn't up a great deal, but there is a favorable indication of an upward trend."

INGOT INVENTORIES LOW— Several Pittsburgh area steelmakers will step up blast furnace and open hearth operations before long. They've finally worked their way through top-heavy inventories of ingots, tube rounds, and bars. Production increases in the Wheeling district reflect depletion of semifinished inventories more than improved demand for steel.

PRODUCTION STEADY— Steelmaking operations held at 52.5 per cent of capacity last week. Production was about 1,417,500 tons of ingots and steel for castings. During the corresponding week last year, 2,401,000 tons were produced.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Mar. 16	Change	Same Week 1957	Same Week 1956
Pittsburgh	54	— 0.5*	97.5	103
Chicago	57.5	0*	93	101
Mid-Atlantic	56	— 3*	98	100
Youngstown	52	— 1	96	98
Wheeling	70	+ 5.5	92	97
Cleveland	34.5	— 2*	87	99.5
Buffalo	36.5	0	100	105
Birmingham	49.5	— 2	95.5	87.5
New England	50	— 2	66	80
Cincinnati	53.5	+ 24.5	81	99
St. Louis	79	0	91	101
Detroit	46.5	+ 4*	93	100
Western	69	0	105	102
National Rate	52.5	0	94.5	99.5

INGOT PRODUCTION‡

	Week Ended Mar. 16	Week Ago	Month Ago	Year Ago
INDEX (1947-49=100)	89.8†	88.7	90.0	149.5
NET TONS (In thousands)	1,442†	1,425	1,445	2,401

*Change from preceding week's revised rate. †Estimated. ‡American Iron & Steel Institute. Weekly capacity (net tons): 2,699,173 in 1958; 2,559,490 in 1957; 2,461,893 in 1956.

REVERE *Welded* STEEL TUBING

why you can depend on REVERE!

1 A wide selection of shapes (rounds, squares, rectangles, etc.) . . . *mechanical or pressure* tubing . . . produced to fit your specific needs.

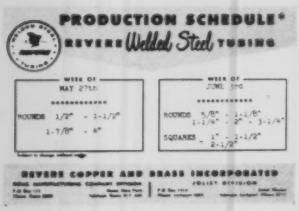
2 Continuing set-ups of popular sizes assure *speedy delivery* . . . sizes range from ¼" O.D. to 5" O.D. with proportionate sizes in squares, rectangles and special shapes.

3 Wall thicknesses range from *.028" to .250"* and *.065" to .250"* depending upon the size and grade tube . . . C-1010 to C-1030 steels are available . . . coated or low alloy — high strength steels may also be specified.

4 *Complete facilities* for annealing, normalizing, sink or mandrel drawing and hydrotesting. . . . Do you have a special fabrication requirement?

All of these features are backed by REVERE'S more than *35 years' experience* in producing electric welded steel tubing for every type application. *Try REVERE next time! You'll be glad you did!*

KEEP YOUR PRODUCTION ON SCHEDULE—KEEP IN TOUCH WITH REVERE

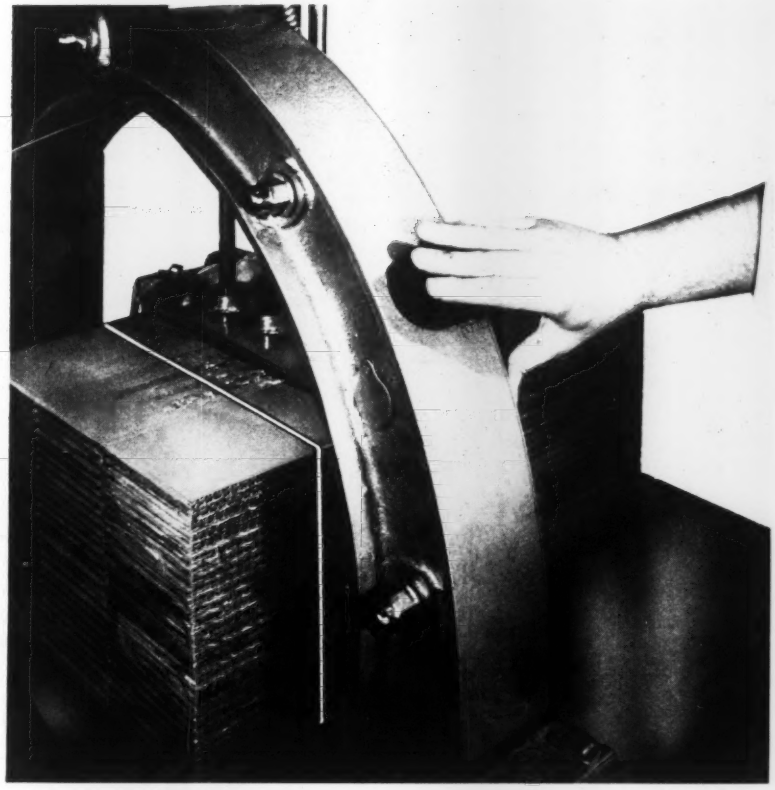


Shown at left is a sample of the card mailed every two weeks, in advance, showing Revere's Production Schedule. Our customers have found it to be extremely helpful. Shall we place your name on the list? No obligation, of course, and you need not be a Revere customer.

Send today for these two informative booklets: 1 — Revere Welded Steel Tubing Catalog. 2 — Commercial Tolerances for Welded Steel Tubing.

WELDED STEEL 18 01 REVERE TUBING

REVERE COPPER AND BRASS INCORPORATED
Founded by Paul Revere in 1801
Rome Manufacturing Company Division
Box 111 Rome, N. Y.



U. S. Steel Corp.

Push the button and the bundle is automatically tied with round steel strapping

Strapping Goes Automatic

This industry is feeling the economic downtrend, but it is expected to be an above average performer this year. Long term prospects add note of optimism

CONSUMPTION of steel strapping this year will probably fall below the 1957 figure, although dollar sales may be pretty comparable.

The present dip is regarded merely as an interruption in the industry's vigorous growth. In fact, it is expected to do better than the economy as a whole this year. Two reasons stand out:

1. Cost reductions can be realized through improved packaging. So applications will probably expand. Trends toward automatic handling in packaging are growing and will be stimulated by management's desire to cut costs. 2. The industry is coming up with new uses.

Real Comer—Observers estimate that the industry has grown as much as 40 per cent in the last ten years. One manufacturer reports his sales have increased 317 per cent since 1947. Another says his market doubled from 1947 to 1957.

Especially optimistic are producers who have recently expanded their facilities for making strapping and equipment to apply it and those who introduced new items the past year. One company reports it added more new customers during 1957 than in any other year.

Applications—The packaging of building and refractory bricks and lumber is one of the newer uses. Another fast growing application: Strapping is being used to secure concrete forms. Novel, though limited, is the application of strapping to hold strands of steel wire in position during the fabrication of prestressed concrete beams. Stainless steel strapping is used to secure insulation to hot vessels.

The steel industry is the biggest user. Other large consuming industries are automotive, paper, textile, metalworking, lumber, building products, agriculture, aircraft, food appliances, and machinery.

About a dozen companies in the U. S. make strapping, and about ten distribute their products nationally.

Improvements—General types are strip, round wire, oval wire, and flat wire. Improvements have been chiefly in finish coatings and edges. Most strapping is of low carbon analysis, although there is increasing use of high carbon flat strapping in the larger sizes which are cold rolled and heat treated. Coatings provide corrosion protection and facilitate application.

One producer has a new oval strapping which it claims yields savings of 50 to 75 per cent in feet per pound without sacrificing strength. Another company sells 500 lb of round wire in a fiber drum—it formerly sold 100-lb spools. The same company is offering additional sizes in its flat strapping line.

Automation—The last two years have seen considerable progress in portable, pneumatically powered tools for the application of the product. Equipment is available to apply any type of strapping automatically. (Pneumatic, electrical, or hydraulic power is used.)

One large company says it is being asked to make more advanced tools and machines for its customers. Such equipment is frequently installed as an integral part of production lines.

Another firm has brought out a combination strapper providing full pneumatic power for tensioning, sealing, and cutting. One company has a machine which forms its own seal, obviating a separate metal clip or seal.

One manufacturer points out that automatic machines handle such widely different products as barrel staves, nail cartons, mine bolts,

fence posts, coils of wire, hardwood flooring, steel strip, and paper rolls.

Although power equipment is getting the headlines, manually operated tools are also being improved. One line features such improvements as torque tensioning devices and a built-in shear.

Trends—Most strapping machines are leased or rented, but a trend toward buying, particularly manually operated equipment, is developing. Most manufacturers will lease or sell.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 139 & 140

What could easily prove to be the most significant development in months in the market for light, flat-rolled steel was the recent reduction in gage and width extras on hot-rolled strip, 6 to 12 in., inclusive, mill edge.

The reduction, amounting to $2 to $5 a ton, was initiated by Sharon Steel Corp., Sharon, Pa., and was immediately followed by other producers, including U. S. Steel Corp. (Last week, STEEL erroneously reported the revision as applying on cold-rolled strip.)

Warrants Watching—It would be brash to read "too much" into this relatively minor price revision. But since it's the first formal downward change in the price structure in many months (exclusive of the elimination of premium prices), purchasers are reminded to keep their eyes on the extras cards for the first sign of a break in the general market.

So far in the slump, prices have held firm, except for some sniping in fabricated structurals and warehouse quotations. The cut in the hot-rolled strip card is said to have been taken as a definite step to maintain market position among producers as the scramble for orders intensifies.

Disappointing — Sheet and strip order volume still has not come up to expectations. Automotive buying is almost at a standstill, and the outlook for April and May auto business is not too encouraging. The motor car builders have been deferring shipments of tonnage on mill books for some time.

In a few instances, users are ordering farther ahead, but availability of prompt shipments makes large-volume forward buying unnecessary. Slightly heavier buying of carbon sheets lately by some New England consumers was offset by the deferment of March orders by certain other users. Shipments for March, over-all, will be heavier than February's by a slight margin.

Consumption Fair — Users are still eating into inventories, use being substantially in excess of buying. It is thought that stocks have not yet dropped to a point where buyers, especially the larger ones, feel justified in starting to build them up. Generally, manufacturers see no improvement in sight for their own finished goods, and they are not under pressure to keep their supply bins full. Anyway, they anticipate no tightening in sheet and strip supply in the near future, being able to get deliveries within two weeks on hot-rolled sheets, and almost as quickly on cold-rolled.

Galvanized sheets and strip can be had for prompt shipment, and there are no delivery problems in

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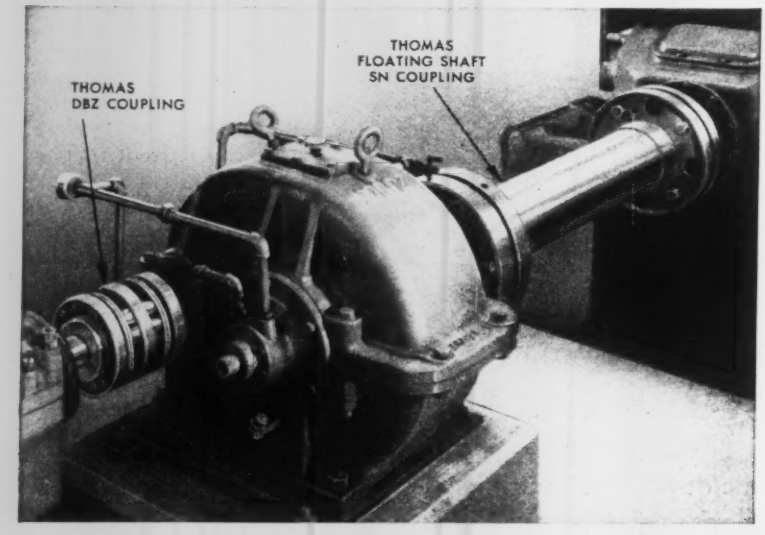

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obtaining specialties, such as electrical sheets, enameling stock, and stainless material.

Demand for galvanized sheets is a little stronger seasonably.

Manufacturers of metal furniture, cabinets, shelving, and door bucks, are specifying a little more freely, and there is some improvement in demand for air conditioning ducts. Inquiry from manufacturers of household appliances and light domestic water tanks is lagging. One manufacturer of stoves has cut back requirements for this month and early April.

Wire . . .

Wire Prices, Pages 140 & 141

Merchant wire demand has picked up a little, but domestic sellers complain of stiff competition along the Atlantic seaboard from European producers, especially in barbed wire and nails.

Inquiry for manufacturers wire continues to lag. A slight improvement in demand for steel wire strand is led by an inquiry for 18 million ft, seven-wire, bright, for the U. S. Engineer, Memphis, Tenn., bids Mar. 18.

Tubular Goods . . .

Tubular Goods Prices, Page 142

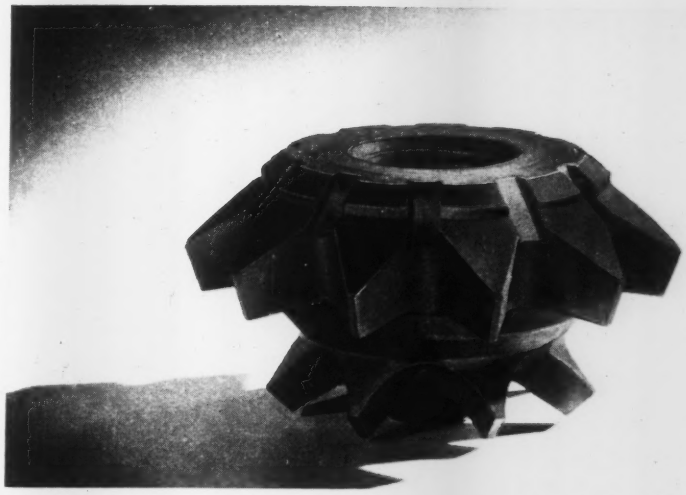
Although producers of oil country goods think the number of wells drilled this year will not fall far behind the 1957 total, they are less optimistic about tubular goods demand. Drillers are still reducing stocks, and they give no sign of returning to the market soon.

Demand for tubular items is light, but there is a scattering of orders for high alloy material. Little hope is held out for much improvement in the market situation next month.

At Pittsburgh, a major pipemaker has changed its order acceptance pattern. It is now taking tonnage as late as the fifteenth of the month for delivery the following month. Previously, it held strictly to the customary 30-day leadtime.

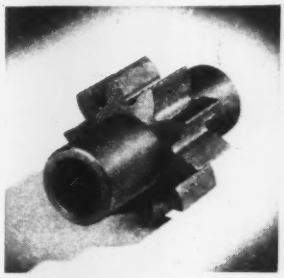
Large diameter pipe demand is near a standstill, chiefly because of the adverse gas rate decision in the Memphis case. Not much activity is anticipated in the line pipe market until final outcome of this case in the upper courts.

Seamless tube production is expected to drop about 10 per cent

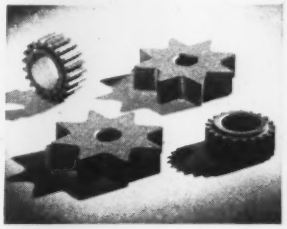


Oil well drill bit, carbide-surfaced by ASC, outlasts 5 untreated bits . . . cuts downtime 50% for oil exploration company.

The original stainless steel crimping roller showed definite signs of wear after processing 1 to 1½ million food cans. Identical rollers, ASC treated, processed 28 million food cans . . . showing no appreciable wear.



An ASC treated gear pump component outlasts 6 untreated units. In addition, its corrosion and heat resistance prevents contamination of the plastic material being processed.



Drive and spur gears, after ASC Metal Diffusion Treatment, have 3 to 4 times the wear resistance of untreated gears.

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Iron, steel and ferrous-base products which have to take the punishment of severe wear can now be given a treatment which vastly increases their resistance to wear and abrasion.

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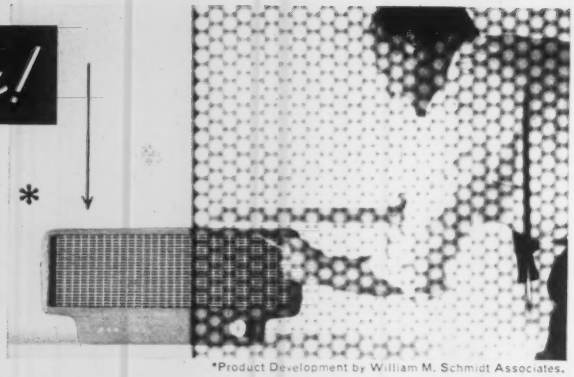

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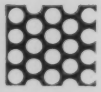

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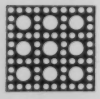

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this month, but buttweld pipe output is holding steady. Rising demand for buttweld is customary as the spring building season opens up. Jobbers are well stocked.

Lone Star Steel Co., Lone Star, Tex., reduced production last week, the curtailment affecting 1500 employees.

E. B. Germany, president, gave several reasons including: The decision in the "Memphis Case" (applying to pipelines), the Presidential veto of the Harris Bill, and an oversupply of oil which slowed down exploration, drilling, and pipeline construction.

Stainless Steel . . .

Stainless Steel Prices, Page 142

Stainless steel products continue to move slowly. There's a lack of active automotive buying which has a depressing effect on the over-all market. Flat-rolled volume in New England is reported off about 20 per cent. One exception is a Portland, Maine, tank shop building missile fuel tanks.

Jones & Laughlin's Stainless Steel Div. at Detroit has resumed partial operation following a week's shutdown.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 138

Reinforcing steel sellers are confidently looking forward to a surge in demand as the spring building season opens up. Suppliers hold fair backlogs, and these will expand as weather conditions encourage active construction on numerous projects pending throughout the country.

Close attention is being given to developments in Washington that may have a bearing on hurrying along government projects.

The anticipated pickup in wire mesh and road building materials is developing more slowly than some sellers had thought it would. In the Detroit area, for example, a trickle of orders is being entered on books currently.

At St. Louis, barmakers are getting ready for a heavy demand that they expect to develop within two weeks. Concrete mesh bookings there are reported heavy, but releases against orders are light. Capacity operations in both bars and mesh are anticipated this spring

with numerous highways and bridge building projects pending in the area.

Continental Steel Corp., Kokomo, Ind., added reinforcing bars to its product mix in mid-1957. It recently completed installation of equipment which substantially increases its capacity to produce that product.

Tin Plate . . .

Tin Plate Prices, Page 140

Demand for tin plate holds at the best level of all the major steel products. Facilities at some producing points are operating close to capacity. Chicago producers are working at 80 to 85 per cent.

Plates . . .

Plate Prices, Page 138

Contrasting sharply with market conditions of only a few months ago, sheared plate is in easy supply. Most producers can give shipments within two to three weeks, and there is nothing to indicate any early tightening in supply conditions. Sizable stocks are held by such large users as electrical manufacturers and railroad equipment builders.

Some improvement in construction requirements is likely to develop shortly. Also, tank needs and shipbuilding specifications should go up soon. But April tonnage will not register much gain over March's, except for building.

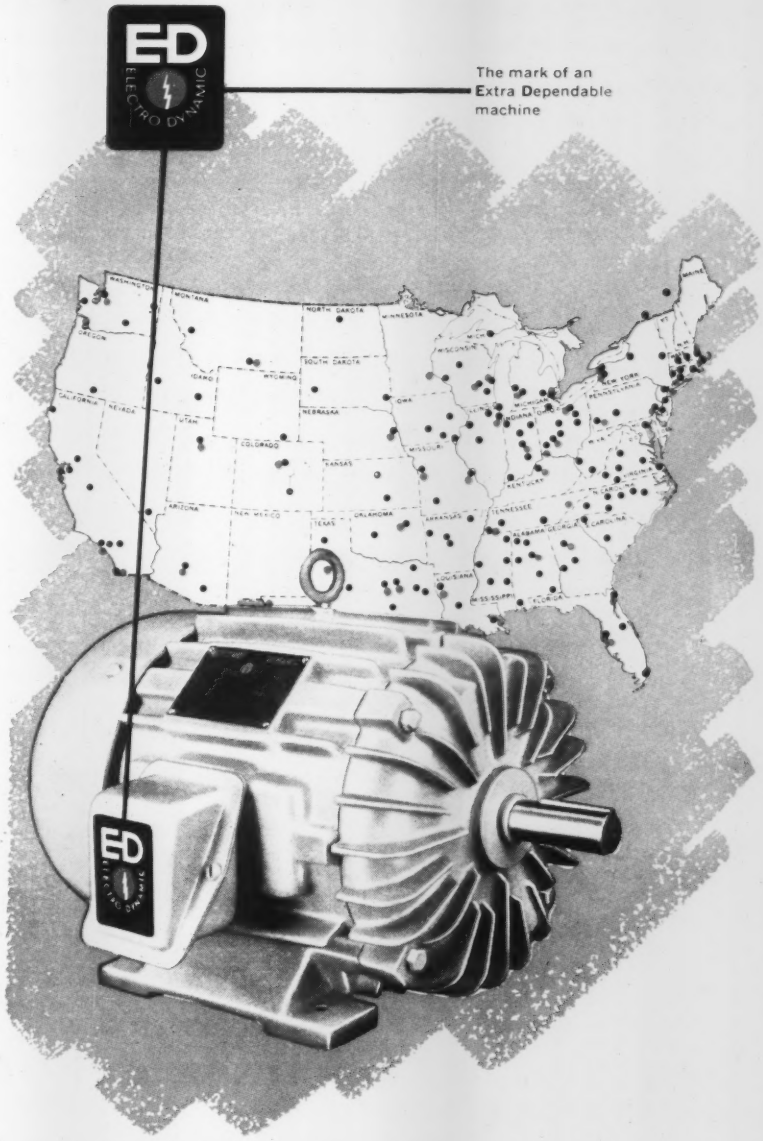
There will be plenty of producing capacity to take care of any expansion in requirements now in sight.

Steel Bars . . .

Bar Prices, Page 138

Has bar demand bottomed? One hot bar maker at Pittsburgh says his order book this month is better than it was in February. Another producer thinks his volume will be off 5 to 10 per cent.

Such divergent reports pretty much sum up prevailing market opinion, but sentiment is a little more bullish, over-all, than it has been in recent weeks. This traces to expectations of an early second-quarter pickup, and, in some instances, to a late February flurry



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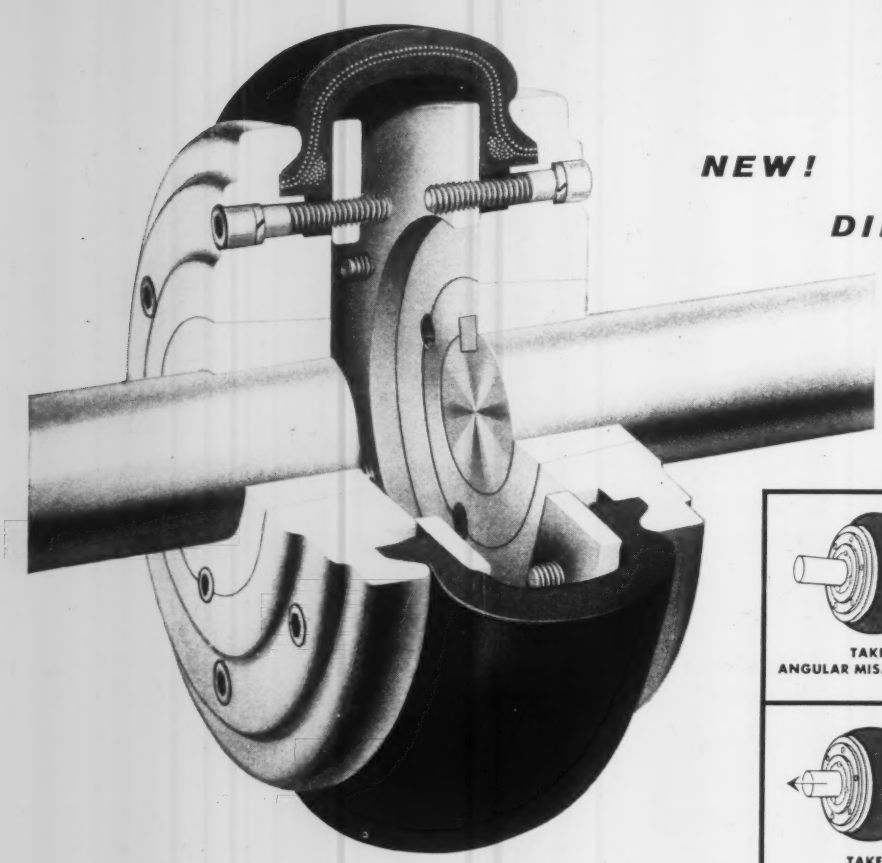

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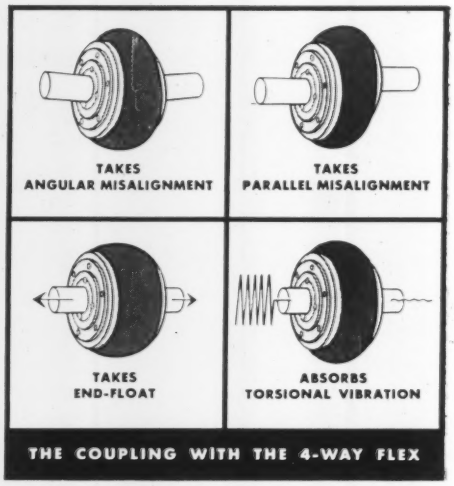

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of hot bar orders from the cold-drawn mills.

Producers say consumers are buying only for immediate needs despite the general decline in inventories. Users are making no effort to build stocks and are not expected to so long as quick mill shipments are available. Some sizes, (hot rolled and cold drawn) can be shipped from stocks. The decline in defense contracts has reduced consumption of alloy bars to a low point. Arsenal, chain, and forge shops in New England are buying small lots only.

Semifinished Steel . . .

Semifinished Prices, Page 138

While steel production is still contracting at some points, it begins to look like the stage is getting set for a quick turnabout in ingot operations. At Pittsburgh, for example, output of raw steel no longer is being held back by an oversupply of semifinished products in terms of demand for finished items.

Earlier this year, area producers built up large stocks of semifinished in anticipation of increased demand. When this failed to materialize, several mills cut ingot production. Now a local mill manager says: "We have trimmed our semifinished steel supply to the point that we now have a shortage of ingots."

Another district producer says it has cut down its oversupply of semifinished; its ingot operations now reflect actual demand for finished products.

Producers appear to be in better position to move ahead quickly once finished steel buying begins to burgeon. Some producers are taking advantage of the lull to make repairs. Bethlehem Steel, for instance, will shut down its 40-in. blooming mill at Lackawanna for a 12-day repair job. Bethlehem is operating 12 of its 35 open hearths in the Buffalo district.

Steel Shipments Go Up

Mill shipments of finished steel products totaled 5,215,417 net tons in January, reports the American Iron & Steel Institute. That's an increase of 122,504 tons from the December total, 5,092,913 tons, but was down sharply from the 7,809,451 tons moved in January, 1957.

Products shipped in greatest amounts in the month included: Cold-rolled sheets, 873,336 tons; plates, 523,683 tons; hot-rolled sheets, 510,560 tons; electrolytic tin plate, 474,359 tons; heavy structural shapes, 449,115 tons. Those products accounted for 54 per cent of total shipments during the month.

The largest domestic shipments in January went to: Automotive, 985,785 tons; warehouses and distributors, 821,788 tons; construction, including maintenance, 746,721 tons; containers, 574,417 tons; machinery, industrial equipment and tools, 289,220 tons. All told those markets accounted for 69 per cent of total domestic shipments of 4,951,422 tons in the month.

Steel Ingot Production—February, 1958

Period	—OPEN HEARTH— Net tons	Per cent of capacity	—BESSEMER— Net tons	Per cent of capacity	—ELECTRIC— Net tons	Per cent of capacity	—TOTAL— Net tons	Per cent of capacity
1958								
*January	6,085,124	58.6	121,338	35.5	547,440	44.8	6,753,902	56.5
†February	5,253,000	56.0	82,000	26.5	453,000	41.0	5,788,000	53.6
1957								
January	9,829,691	99.0	294,839	77.1	884,232	86.5	11,008,762	97.1
February	8,898,671	99.2	277,682	80.4	810,853	87.8	9,987,206	97.6
March	9,442,164	95.1	275,156	71.9	871,754	85.2	10,589,074	93.4
1st Qtr.	28,170,526	97.7	847,677	76.3	2,566,839	86.4	31,585,042	96.0
April	8,820,328	91.8	231,731	62.6	762,721	77.1	9,814,780	89.5
May	8,842,707	89.1	201,864	52.8	747,752	73.1	9,792,323	86.4
June	8,498,903	88.4	210,915	57.0	681,584	68.9	9,391,402	85.6
2nd Qtr.	26,161,938	89.8	644,510	57.4	2,192,057	73.0	28,998,505	87.2
1st 6 Mo.	54,332,464	93.7	1,492,187	66.8	4,758,896	79.7	60,583,547	91.5
July	8,086,519	81.4	194,638	50.9	627,575	61.4	8,908,732	78.6
August	8,297,172	83.6	204,723	53.5	731,995	71.6	9,233,890	81.5
September	8,135,139	84.7	185,967	50.2	656,800	66.4	8,977,906	81.8
3rd Qtr.	24,518,830	83.2	585,328	51.5	2,016,370	66.4	27,120,528	80.6
9 Mo.	78,851,294	90.2	2,077,515	61.7	6,775,266	75.2	87,704,075	87.9
October	8,348,522	84.1	154,577	40.4	694,618	67.9	9,197,717	81.1
November	7,674,698	79.9	134,709	36.4	583,512	59.0	8,392,919	76.5
December	6,783,262	68.3	108,237	28.3	528,686	51.7	7,420,285	65.5
4th Qtr.	22,806,482	77.4	397,623	35.0	1,806,816	59.5	25,010,921	74.4
2nd 6 Mo.	47,325,312	80.3	982,951	43.3	3,823,186	63.0	52,131,449	77.5
Total	101,657,776	87.0	2,475,138	54.9	8,582,082	71.3	112,714,996	84.5

Note—The percentages of capacity operated are based on annual capacities as of Jan. 1, 1958 as follows: Open hearth 122,321,830 net tons; bessemer 4,027,000 net tons; oxygen process, electric and crucible 14,398,740 net tons. Total for 1958, 140,742,570 net tons. For 1957, the capacity tonnages are: Open hearth 116,912,410 net tons; bessemer 4,505,000 net tons; oxygen process, electric and crucible 12,041,740 net tons. Total for 1957, 133,459,150 net tons.

*Revised

†Preliminary

Tool Steel . . .

Tool Steel Prices, Page 142

Shipments of high speed and tool steel (excluding hollow drill steel) totaled 6549 net tons in January, reports the American Iron & Steel Institute. The December output was 6710 tons, vs. 9457 tons in January, 1957.

The breakdown: Class A high speed steel, 846 tons, vs. 1808 in December and 1163 in January, 1957; Class B high speed steel, 195 tons, vs. 180 in December and 269 in January a year ago; other tool steels, 5641 tons, vs. 4798 in December and 8225 in January last year. Comparisons:

High Speed & Tool Steel Shipments
(Net tons)

Grade	Class A High Speed Steel January, 1958	Class A High Speed Steel January, 1957
I	393	659
I-b	70	103
I-c	5	8
II	276	269
II-c	13	6
III	80	80
III-c	9	38
Total	846	1,163
Grade	**Class B High Speed Steel**	**Class B High Speed Steel**
IV	141	185
IV-b	6	19
IV-c	48	65
Total	195	269
Grade	**Other Tool Steels**	**Other Tool Steels**
V	737	1,289
VI	707	918
V11	3,397	4,810
VIII	800	1,208
Total	5,641	8,225
Grand Total	6,682	9,657
Less conversion	133	200
Net Total	6,549	9,457

A moderate upswing in tool steel shipments at Pittsburgh is not considered particularly significant, says J. P. Gill, president, Vanadium-Alloys Steel Co. But that company's February shipment orders topped its January volume.

Other Pittsburgh area tool steel sellers think the low point of the slowdown in their business has been passed.

Less Steel in February

Production of ingots and steel for castings in February declined to 5,788,000 net tons from 6,753,902 tons in January and 9,987,206 tons in February, 1957, reports the American Iron & Steel Institute.

The institute's index of steelmaking for the month was 90.1 in terms of the basic index of average production for the 1947-49 period. Comparisons: 94.9 during January and 155.4 in February a year ago.

Output in February averaged 53.6 per cent of capacity.

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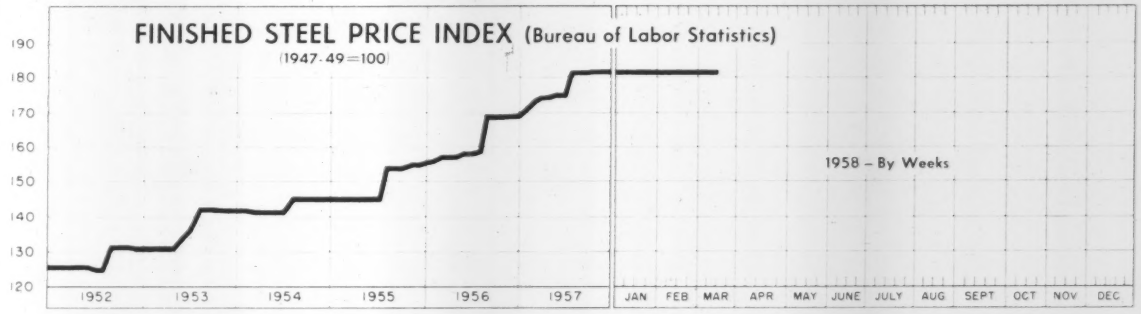
BENDING

Price Indexes and Composites



Mar. 11, 1958	Week Ago	Month Ago	Feb. Avg.	Year Ago
181.7	181.7	181.8	181.8	173.9

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 11

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.600	Bars, Reinforcing	6.210
Rails, Light, 40 lb	7.067	Bars, C.F., Carbon	10.360
Tie Plates	6.600	Bars, C.F., Alloy	13.875
Axles, Railway	9.825	Bars, C.F., Stainless, 302 (lb)	0.553
Wheels, Freight Car, 33 in. (per wheel)	60.000	Sheets, H.R., Carbon	6.192
Plates, Carbon	6.150	Sheets, C.R., Carbon	7.089
Structural Shapes	5.942	Sheets, Galvanized	8.270
Bars, Tool Steel, Carbon (lb)	0.535	Sheets, C.R., Stainless, 302 (lb)	0.688
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.650	Sheets, Electrical	12.025
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.355	Strip, C.R., Carbon	9.243
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.850	Strip, C.R., Stainless, 430 (lb)	0.493
Bars, H.R., Alloy	10.525	Strip, H.R., Carbon	6.095
Bars, H.R., Stainless, 303 (lb)	0.525	Pipe, Black, Buttweld (100 ft)	19.814
Bars, H.R., Carbon	6.425	Pipe, Galv., Buttweld (100 ft)	23.264
		Pipe, Line (100 ft)	199.023
		Casing, Oil Well, Carbon (100 ft)	194.499
		Casing, Oil Well, Alloy (100 ft)	304.610
		Tubes, Boiler (100 ft)	49.130
		Tubing, Mechanical, Carbon (100 ft)	24.953
		Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483
		Black Plate, Canmaking Quality (95 lb base box)	7.583
		Wire, Drawn, Carbon	10.225
		Wire, Drawn, Stainless, 430 (lb)	0.653
		Bale Ties (bundles)	7.967
		Nails, Wire, 8d Common	9.828
		Wire, Barbed (80-rod spool)	8.719
		Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Mar. 12 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	239.15	239.15	239.15	227.41	181.31
Index in cents per lb	6.479	6.479	6.479	6.161	4.912

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$145.42	$145.42	$145.42	$139.51	$110.98
No. 2 Fdry Pig Iron, GT	66.49	66.49	66.49	64.56	55.04
Basic Pig Iron, GT	65.99	65.99	65.99	64.11	54.66
Malleable Pig Iron, GT	67.27	67.27	67.27	65.63	55.77
Steelmaking Scrap, GT	36.83	37.17	37.67	50.33	43.17

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	Mar. 12 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.425	5.425	5.425	5.075	3.95
Bars, H.R., Chicago	5.425	5.425	5.425	5.075	3.95
Bars, H.R., deld., Philadelphia	5.725	5.725	5.725	5.365	4.502
Bars, C.F., Pittsburgh	7.30*	7.30*	7.30*	6.85*	4.925
Shapes, Std., Pittsburgh	5.275	5.275	5.275	5.00	3.85
Shapes, Std., Chicago	5.275	5.275	5.275	5.00	3.85
Shapes, deld., Philadelphia	5.545	5.545	5.545	5.31	4.13
Plates, Pittsburgh	5.10	5.10	5.10	4.85	3.90
Plates, Chicago	5.10	5.10	5.10	4.85	3.90
Plates, Coatesville, Pa.	5.10	5.10	5.10	5.25	4.35
Plates, Sparrows Point, Md.	5.10	5.10	5.10	4.85	3.90
Plates, Claymont, Del.	5.10	5.10	5.10	5.70	4.35
Sheets, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.775
Sheets, H.R., Chicago	4.925	4.925	4.925	4.675	3.775
Sheets, C.R., Pittsburgh	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Chicago	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Detroit	6.05-6.15	6.05-6.15	6.05-6.15	5.75-5.85	4.775
Sheets, Galv., Pittsburgh	6.60	6.60	6.60	6.30	5.075
Strip, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.975-4.225
Strip, H.R., Chicago	4.925	4.925	4.925	4.675	3.725
Strip, C.R., Pittsburgh	7.15	7.15	7.15	6.85	5.10-5.80
Strip, C.R., Chicago	7.15	7.15	7.15	6.85	5.35
Strip, C.R., Detroit	7.25	7.25	7.25	6.95	5.30-6.05
Wire, Basic, Pittsburgh	7.65	7.65	7.65	7.20	5.225-5.475
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.49	6.35
Tin plate(1.50 lb)box, Pitts.	$10.30	$10.30	$10.30	$9.95	$8.95

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$96.00	$96.00	$96.00	$91.50	$70.50
Wire rods, 7/32-5/8" Pitts.	6.15	6.15	6.15	5.80	4.425

PIG IRON, Gross Ton

	Mar. 12 1958	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$67.00	$67.00	$67.00	$65.50	$55.50
Basic, Valley	66.00	66.00	66.00	64.50	54.50
Basic, deld., Phila.	70.41	70.41	70.41	68.38	59.25
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	65.00	55.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	65.00	55.00
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	68.88	59.75
No. 2 Fdry, Birm.	62.50	62.50	62.50	59.00	51.38
No. 2 Fdry (Birm.) deld. Cin.	70.20	70.20	70.20	66.70	58.93
Malleable, Valley	66.50	66.50	66.50	65.00	55.00
Malleable, Chicago	66.50	66.50	66.50	65.00	55.00
Ferromanganese, Duquesne	245.00†	245.00†	245.00†	255.00†	228.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$36.50	$36.50	$35.50	$50.50	$44.00
No. 1 Heavy Melt, E. Pa.	38.50	38.50	38.50	54.00	43.00
No. 1 Heavy Melt, Chicago	35.50	36.50	39.00	46.50	42.50
No. 1 Heavy Melt, Valley	37.50	37.50	37.50	48.50	44.25
No. 1 Heavy Melt, Cleve.	33.50	33.50	33.50	45.50	44.25
No. 1 Heavy Melt, Buffalo	28.50	28.50	28.50	48.50	43.50
Rails, Rerolling, Chicago	55.50	54.50	56.50	59.50	53.50
No. 1 Cast, Chicago	41.50	41.50	42.50	42.50	43.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$15.25	$14.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.00	17.00

Steel Prices

Mill prices as reported to STEEL, Mar. 12, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 139; to footnotes, page 141.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall, Pa. U5 ..... $73.50

INGOTS, Alloy (NT)
Detroit S41 ..... $77.00
Farrell, Pa. S3 ..... 77.00
Lowellville, O. S3 ..... 77.00
Midland, Pa. C18 ..... 77.00
Munhall, Pa. U5 ..... 77.00
Sharon, Pa. S3 ..... 77.00

BILLETS, BLOOMS & SLABS
Bessemer, Rerolling (NT)
Bessemer, Pa. U5 ..... $77.50
Buffalo R2 ..... 77.50
Clairton, Pa. U5 ..... 77.50
Ensley, Ala. T2 ..... 77.50
Fairfield, Ala. T2 ..... 77.50
Fontana, Calif. K1 ..... 88.00
Gary, Ind. U5 ..... 77.50
Johnstown, Pa. B3 ..... 77.50
Lackawanna, N.Y. B2 ..... 77.50
Munhall, Pa. U5 ..... 77.50
Owensboro, Ky. G8 ..... 77.50
S. Chicago, Ill. R2, U5 ..... 77.50
S. Duquesne, Pa. U5 ..... 77.50
Sterling, Ill. N15 ..... 77.50
Youngstown R2 ..... 77.50

Carbon, Forging (NT)
Bessemer, Pa. U5 ..... $96.00
Buffalo R2 ..... 96.00
Canton, O. R2 ..... 98.50
Clairton, Pa. U5 ..... 96.00
Conshohocken, Pa. A3 ..... 101.00
Ensley, Ala. T2 ..... 96.00
Fairfield, Ala. T2 ..... 96.00
Fontana, Calif. K1 ..... 105.50
Gary, Ind. U5 ..... 96.00
Geneva, Utah C11 ..... 96.00
Houston S5 ..... 101.00
Johnstown, Pa. B2 ..... 96.00
Lackawanna, N.Y. B2 ..... 96.00
Los Angeles B3 ..... 105.50
Midland, Pa. C18 ..... 96.00
Munhall, Pa. U5 ..... 96.00
Owensboro, Ky. G8 ..... 96.00
Seattle B3 ..... 109.50
Sharon, Pa. S3 ..... 96.00
S. Chicago R2, U5, W14 ..... 96.00
S. Duquesne, Pa. U5 ..... 96.00
S. San Francisco B3 ..... 105.50
Warren, O. C17 ..... 96.00

Alloy, Forging (NT)
Bethlehem, Pa. B2 ..... $114.00
Bridgeport, Conn. C32 ..... 114.00
Buffalo R2 ..... 114.00
Canton, O. R2, T7 ..... 114.00
Conshohocken, Pa. A3 ..... 121.00
Detroit S41 ..... 114.00
Economy, Pa. B14 ..... 114.00
Farrell, Pa. S3 ..... 114.00
Fontana, Calif. K1 ..... 135.00
Gary, Ind. U5 ..... 114.00
Houston S5 ..... 119.00
Ind. Harbor, Ind. Y1 ..... 114.00
Johnstown, Pa. B2 ..... 114.00
Lackawanna, N.Y. B2 ..... 114.00
Los Angeles B3 ..... 134.00
Lowellville, O. S3 ..... 114.00
Massillon, O. R2 ..... 114.00
Midland, Pa. C18 ..... 114.00
Munhall, Pa. U5 ..... 114.00
Owensboro, Ky. G8 ..... 114.00
Sharon, Pa. S3 ..... 114.00
S. Chicago R2, U5, W14 ..... 114.00
S. Duquesne, Pa. U5 ..... 114.00
Struthers, O. Y1 ..... 114.00
Warren, O. C17 ..... 114.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $117.50
Canton, O. R2 ..... 120.00
Cleveland R2 ..... 117.50
Gary, Ind. U5 ..... 117.50
S. Chicago, Ill. R2, W14 ..... 117.50
S. Duquesne, Pa. U5 ..... 117.50
Warren, O. C17 ..... 117.50

SKELP
Aliquippa, Pa. J5 ..... 5.075
Munhall, Pa. U5 ..... 4.875
Pittsburgh J5 ..... 5.075
Warren, O. R2 ..... 4.875
Youngstown R2, U5 ..... 4.875

WIRE RODS
Alabama City, Ala. R2 ..... 6.15
Aliquippa, Pa. J5 ..... 6.15
Alton, Ill. L1 ..... 6.35
Buffalo W12 ..... 6.15
Cleveland A7 ..... 6.15
Donora, Pa. A7 ..... 6.15
Fairfield, Ala. T2 ..... 6.15
Houston S5 ..... 6.40
Indiana Harbor, Ind. Y1 ..... 6.15
Johnstown, Pa. B2 ..... 6.15
Joliet, Ill. A7 ..... 6.15
Kansas City, Mo. S5 ..... 6.40
Kokomo, Ind. C16 ..... 6.25
Los Angeles B3 ..... 6.95
Minnequa, Colo. C10 ..... 6.40
Monessen, Pa. P7 ..... 6.15
N. Tonawanda, N.Y. B11 ..... 6.15
Pittsburg, Calif. C11 ..... 6.95
Portsmouth, O. P12 ..... 6.15
Roebling, N.J. R5 ..... 6.25
S. Chicago, Ill. R2 ..... 6.15
Sparrows Point, Md. B2 ..... 6.25
Sterling, Ill. (1) N15 ..... 6.15
Sterling, Ill. N15 ..... 6.25
Struthers, O. Y1 ..... 6.15
Worcester, Mass. A7 ..... 6.45

STRUCTURALS

Carbon Steel Std. Shapes
Alabama City, Ala. R2 ..... 5.275
Atlanta A11 ..... 5.475
Aliquippa, Pa. J5 ..... 5.275
Bessemer, Ala. T2 ..... 5.275
Bethlehem, Pa. B2 ..... 5.325
Birmingham C15 ..... 5.275
Clairton, Pa. U5 ..... 5.275
Fairfield, Ala. T2 ..... 5.275
Fontana, Calif. K1 ..... 6.075
Gary, Ind. U5 ..... 5.275
Geneva, Utah C11 ..... 5.275
Houston S5 ..... 5.375
Ind. Harbor, Ind. I-2 ..... 5.275
Johnstown, Pa. B2 ..... 5.325
Joliet, Ill. P22 ..... 5.275
Kansas City, Mo. S5 ..... 5.375
Lackawanna, N.Y. B2 ..... 5.325
Los Angeles B3 ..... 5.975
Minnequa, Colo. C10 ..... 5.575
Munhall, Pa. U5 ..... 5.275
Niles, Calif. P1 ..... 5.925
Phoenixville, Pa. P4 ..... 5.325
Portland, Oreg. O4 ..... 6.025
Seattle B3 ..... 6.025
S. Chicago, Ill. U5, W14 ..... 5.275
S. San Francisco B3 ..... 5.925
Sterling, Ill. N15 ..... 5.275
Torrance, Calif. C11 ..... 5.975
Weirton, W. Va. W6 ..... 5.275

Wide Flange
Bethlehem, Pa. B2 ..... 5.325
Clairton, Pa. U5 ..... 5.275
Fontana, Calif. K1 ..... 6.225
Indiana Harbor, Ind. I-2 ..... 5.275
Lackawanna, N.Y. B2 ..... 5.325
Munhall, Pa. U5 ..... 5.275
Phoenixville, Pa. P4 ..... 5.325
S. Chicago, Ill. U5 ..... 5.275

Alloy Std. Shapes
Aliquippa, Pa. J5 ..... 6.55
Clairton, Pa. U5 ..... 6.55
Gary, Ind. U5 ..... 6.55
Houston S5 ..... 6.65
Kansas City, Mo. S5 ..... 6.65
Munhall, Pa. U5 ..... 6.55
S. Chicago, Ill. U5 ..... 6.55

H.S., L.A. Std. Shapes
Aliquippa, Pa. J5 ..... 7.75
Bessemer, Ala. T2 ..... 7.75
Bethlehem, Pa. B2 ..... 7.80
Clairton, Pa. U5 ..... 7.75
Fairfield, Ala. T2 ..... 7.75
Fontana, Calif. K1 ..... 8.55
Gary, Ind. U5 ..... 7.75
Geneva, Utah C11 ..... 7.75
Houston S5 ..... 7.85
Ind. Harbor, Ind. I-2, Y1 ..... 7.75
Johnstown, Pa. B2 ..... 7.80
Kansas City, Mo. S5 ..... 7.85
Lackawanna, N.Y. B2 ..... 7.80
Los Angeles B3 ..... 8.45
Munhall, Pa. U5 ..... 7.75
Seattle B3 ..... 8.50
S. Chicago, Ill. U5, W14 ..... 7.75
S. San Francisco B3 ..... 8.40
Struthers, O. Y1 ..... 7.75

H.S., L. A. Wide Flange
Bethlehem, Pa. B2 ..... 7.80
Lackawanna, N.Y. B2 ..... 7.80
Munhall, Pa. U5 ..... 7.75
S. Chicago, Ill. U5 ..... 7.75

PILING

BEARING PILES
Bethlehem, Pa. B2 ..... 5.325
Lackawanna, N.Y. B2 ..... 5.325
Munhall, Pa. U5 ..... 5.275
S. Chicago, Ill. U5 ..... 5.275

STEEL SHEET PILING
Lackawanna, N.Y. B2 ..... 6.225
Munhall, Pa. U5 ..... 6.225
S. Chicago, Ill. U5 ..... 6.225
Weirton, W. Va. W6 ..... 6.225

PLATES

PLATES, Carbon Steel
Alabama City, Ala. R2 ..... 5.10
Aliquippa, Pa. J5 ..... 5.10
Ashland, Ky. (15) A10 ..... 5.10
Bessemer, Ala. T2 ..... 5.10
Clairton, Pa. U5 ..... 5.10
Claymont, Del. C22 ..... 5.10
Cleveland J5, R2 ..... 5.20
Coatesville, Pa. L7 ..... 5.10
Conshohocken, Pa. A3 ..... 5.20
Ecorse, Mich. G5 ..... 5.20
Fairfield, Ala. T2 ..... 5.10
Fontana, Calif. (30) K1 ..... 5.90
Gary, Ind. U5 ..... 5.10
Geneva, Utah C11 ..... 5.10
Granite City, Ill. G4 ..... 5.30
Harrisburg, Pa. P4 ..... 5.10
Houston S5 ..... 5.20
Ind. Harbor, Ind. I-2, Y1 ..... 5.10
Johnstown, Pa. B2 ..... 5.10
Lackawanna, N. Y. B2 ..... 5.10
Lone Star, Tex. L6 ..... 5.20
Mansfield, O. E6 ..... 5.10
Minnequa, Colo. C10 ..... 5.95
Munhall, Pa. U5 ..... 5.10
Newport, Ky. A2 ..... 5.10
Pittsburgh J5 ..... 5.10
Riverdale, Ill. A1 ..... 5.10
Seattle B3 ..... 6.00
Sharon, Pa. S3 ..... 5.10
S. Chicago, Ill. U5, W14 ..... 5.10
Sparrows Point, Md. B2 ..... 5.10
Sterling, Ill. N15 ..... 5.10
Steubenville, O. W10 ..... 5.10
Warren, O. R2 ..... 5.10
Youngstown U5, Y1 ..... 5.10

PLATES, Carbon Abras. Resist.
Claymont, Del. C22 ..... 6.75
Fontana, Calif. K1 ..... 7.55
Geneva, Utah C11 ..... 6.75
Houston S5 ..... 6.85
Johnstown, Pa. B2 ..... 6.75
Sparrows Point, Md. B2 ..... 6.75

PLATES, Wrought Iron
Economy, Pa. B14 ..... 13.15

PLATES, H.S., L.A.
Aliquippa, Pa. J5 ..... 7.625
Bessemer, Ala. T2 ..... 7.625
Clairton, Pa. U5 ..... 7.625
Claymont, Del. C22 ..... 7.625
Cleveland J5, R2 ..... 7.625
Coatesville, Pa. L7 ..... 7.925
Conshohocken, Pa. A3 ..... 7.625
Economy, Pa. B14 ..... 7.625
Ecorse, Mich. G5 ..... 7.725
Fairfield, Ala. T2 ..... 7.625
Farrell, Pa. S3 ..... 7.625
Fontana, Calif. (30) K1 ..... 8.425
Gary, Ind. U5 ..... 7.625
Geneva, Utah C11 ..... 7.625
Houston S5 ..... 7.725
Ind. Harbor, Ind. I-2, Y1 ..... 7.625
Johnstown, Pa. B2 ..... 7.625
Munhall, Pa. U5 ..... 7.625
Pittsburgh J5 ..... 7.625
Seattle B3 ..... 8.525
Sharon, Pa. S3 ..... 7.625
S. Chicago, Ill. U5, W14 ..... 7.625
Sparrows Point, Md. B2 ..... 7.625
Warren, O. R2 ..... 7.625
Youngstown U5 ..... 7.625

PLATES, ALLOY
Aliquippa, Pa. J5 ..... 7.20
Claymont, Del. C22 ..... 7.20
Coatesville, Pa. L7 ..... 7.20
Economy, Pa. B14 ..... 7.20
Fontana, Calif. K1 ..... 8.00
Gary, Ind. U5 ..... 7.20
Houston S5 ..... 7.30
Ind. Harbor, Ind. Y1 ..... 7.20
Johnstown, Pa. B2 ..... 7.20
Lowellville, O. S3 ..... 7.20
Munhall, Pa. U5 ..... 7.20
Newport, Ky. A2 ..... 7.20
Pittsburgh J5 ..... 7.20
Seattle B3 ..... 8.10
Sharon, Pa. S3 ..... 7.20
S. Chicago, Ill. U5, W14 ..... 7.20
Sparrows Point, Md. B2 ..... 7.20
Youngstown Y1 ..... 7.20

FLOOR PLATES
Cleveland J5 ..... 6.175
Conshohocken, Pa. A3 ..... 6.175
Ind. Harbor, Ind. I-2 ..... 6.175
Munhall, Pa. U5 ..... 6.175
S. Chicago, Ill. U5 ..... 6.175

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..... 5.35
Ashland l.c.l (15) A10 ..... 5.85
Cleveland c.l. R2 ..... 5.85
Warren, O. c.l. R2 ..... 5.85

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala. City, Ala. (9) R2 ..... 5.425
Aliquippa, Pa. (9) J5 ..... 5.425
Alton, Ill. L1 ..... 5.625
Atlanta (9) A11 ..... 5.625
Bessemer, Ala. (9) T2 ..... 5.425
Birmingham (9) C15 ..... 5.425
Buffalo (9) R2 ..... 5.425
Clairton, Pa. (9) U5 ..... 5.425
Cleveland (9) R2 ..... 5.425
Ecorse, Mich. (9) G5 ..... 5.525
Emeryville, Calif. J7 ..... 6.175
Fairfield, Ala. (9) T2 ..... 5.425
Fairless, Pa. (9) U5 ..... 5.575
Fontana, Calif. (9) K1 ..... 6.125
Gary, Ind. (9) U5 ..... 5.425
Houston (9) S5 ..... 5.675
Ind. Harbor (9) I-2, Y1 ..... 5.425
Johnstown, Pa. (9) B2 ..... 5.425
Joliet, Ill. P22 ..... 5.425
Kansas City, Mo. (9) S5 ..... 5.675
Lackawanna (9) B2 ..... 5.425
Los Angeles (9) B3 ..... 6.125
Midland, Pa. (23) C18 ..... 5.725
Milton, Pa. M18 ..... 5.575
Minnequa, Colo. C10 ..... 5.875
Niles, Calif. P1 ..... 6.125
N. Tonawanda, N.Y. (23) B11 ..... 5.775
Owensboro, Ky. (9) G8 ..... 5.425
Pittsburg, Calif. (9) C11 ..... 6.125
Pittsburgh (9) J5 ..... 5.425
Portland, Oreg. O4 ..... 6.175
Seattle B3, N14 ..... 6.175
S. Ch'c'go (9) R2, U5, W14 ..... 5.425
S. Duquesne, Pa. (9) U5 ..... 5.425
S. San Fran., Calif. (9) B3 ..... 6.175
Sterling, Ill. (1) (9) N15 ..... 5.425
Sterling, Ill. (9) N15 ..... 5.525
Struthers, O. (9) Y1 ..... 5.425
Tonawanda, N.Y. B12 ..... 5.425
Torrance, Calif. (9) C11 ..... 6.125
Youngstown (9) R2, U5 ..... 5.425

BARS, H.R. Leaded Alloy (Including leaded extra)
Warren, O. C17 ..... 7.475

BARS, Hot-Rolled Alloy
Aliquippa, Pa. J5 ..... 6.475
Bethlehem, Pa. B2 ..... 6.475
Bridgeport, Conn. C32 ..... 6.55
Buffalo R2 ..... 6.475
Canton, O. R2, T7 ..... 6.475
Clairton, Pa. U5 ..... 6.475
Detroit S41 ..... 6.475
Economy, Pa. B14 ..... 6.475
Ecorse, Mich. G5 ..... 6.575
Fairless, Pa. U5 ..... 6.625
Farrell, Pa. S3 ..... 6.475
Fontana, Calif. K1 ..... 7.525
Gary, Ind. U5 ..... 6.475
Houston S5 ..... 6.725
Ind. Harbor, Ind. I-2, Y1 ..... 6.475
Johnstown, Pa. B2 ..... 6.475
Kansas City, Mo. S5 ..... 6.725
Lackawanna, N.Y. B2 ..... 6.475
Lowellville, O. S3 ..... 6.475
Los Angeles B3 ..... 7.525
Massillon, O. R2 ..... 6.475
Midland, Pa. C18 ..... 6.475
Owensboro, Ky. G8 ..... 6.475
Pittsburgh J5 ..... 6.475
Sharon, Pa. S3 ..... 6.475
S. Chicago R2, U5, W14 ..... 6.475
S. Duquesne, Pa. U5 ..... 6.475
Struthers, O. Y1 ..... 6.475
Warren, O. C17 ..... 6.475
Youngstown U5 ..... 6.475

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa, Pa. J5 ..... 7.925
Bessemer, Ala. T2 ..... 7.925
Bethlehem, Pa. B2 ..... 7.925
Clairton, Pa. U5 ..... 7.925
Cleveland R2 ..... 7.925
Ecorse, Mich. G5 ..... 8.025
Fairfield, Ala. T2 ..... 7.925
Fontana, Calif. K1 ..... 8.625
Gary, Ind. U5 ..... 7.925
Houston S5 ..... 8.175
Ind. Harbor, Ind. Y1 ..... 7.925
Johnstown, Pa. B2 ..... 7.925
Kansas City, Mo. S5 ..... 8.175
Lackawanna, N.Y. B2 ..... 7.925
Los Angeles B3 ..... 8.625
Pittsburgh J5 ..... 7.925
Seattle B3 ..... 8.675
S. Chicago, Ill. U5, W14 ..... 7.925
S. Duquesne, Pa. U5 ..... 7.925
S. San Francisco B3 ..... 8.675
Struthers, O. Y1 ..... 7.925
Youngstown U5 ..... 7.925

BAR SIZE ANGLES; H.R. Carbon
Bethlehem, Pa. (9) B2 ..... 5.575
Houston (9) S5 ..... 5.675
Kansas City, Mo. (9) S5 ..... 5.675
Lackawanna (9) B2 ..... 5.425
Sterling, Ill. N15 ..... 5.525
Sterling, Ill. (1) N15 ..... 5.425
Tonawanda, N.Y. B12 ..... 5.425

BAR SIZE ANGLES; S. Shapes
Aliquippa, Pa. J5 ..... 5.425
Atlanta A11 ..... 5.625
Joliet, Ill. P22 ..... 5.425
Niles, Calif. P1 ..... 6.125
Pittsburgh J5 ..... 5.425
Portland, Oreg. O4 ..... 6.175
San Francisco S7 ..... 6.275
Seattle B3 ..... 6.175

BAR SHAPES, Hot-Rolled Alloy
Aliquippa, Pa. J5 ..... 6.55
Clairton, Pa. U5 ..... 6.55
Gary, Ind. U5 ..... 6.55
Houston S5 ..... 6.80
Kansas City, Mo. S5 ..... 6.80
Pittsburgh J5 ..... 6.55
Youngstown U5 ..... 6.55

BARS, C.F., Leaded Alloy (Including leaded extra)
Ambridge, Pa. W18 ..... 9.925
Beaver Falls, Pa. M12 ..... 9.925
Camden, N.J. P13 ..... 10.10
Chicago W18 ..... 9.925
Cleveland C20 ..... 9.925*
Elyria, O. W8 ..... 9.925
Los Angeles P2, S30 ..... 11.40*
Monaca, Pa. S17 ..... 9.925
Newark, N.J. W18 ..... 10.10
Spring City, Pa. K3 ..... 10.10
Warren, O. C17 ..... 9.925

*Grade A; add 0.50c for Grade B.

BARS, Cold-Finished Carbon
Ambridge, Pa. W18 ..... 7.30
Beaver Falls, Pa. M12, R2 ..... 7.30
Birmingham C15 ..... 7.90
Buffalo B5 ..... 7.35
Camden, N.J. P13 ..... 7.75
Carnegie, Pa. C12 ..... 7.30
Chicago W18 ..... 7.30
Cleveland A7, C20 ..... 7.30
Detroit B5, P17 ..... 7.50
Detroit S41 ..... 7.30
Donora, Pa. A7 ..... 7.30
Elyria, O. W8 ..... 7.30
Franklin Park, Ill. N5 ..... 7.30
Gary, Ind. R2 ..... 7.30
Green Bay, Wis. F7 ..... 7.30
Hammond, Ind. J5, L2 ..... 7.30
Hartford, Conn. R2 ..... 7.80
Harvey, Ill. B5 ..... 7.30
Los Angeles (49) S30 ..... 8.75
Los Angeles P2, R2 ..... 8.75
Mansfield, Mass. B5 ..... 7.85
Massillon, O. R2, R8 ..... 7.30
Midland, Pa. C18 ..... 7.30
Monaca, Pa. S17 ..... 7.30
Newark, N.J. W18 ..... 7.75
New Castle, Pa. (17) B4 ..... 7.30
Pittsburgh J5 ..... 7.30
Plymouth, Mich. P5 ..... 7.55
Putnam, Conn. W18 ..... 7.85
Readville, Mass. C14 ..... 7.85
S. Chicago, Ill. W14 ..... 7.30
Spring City, Pa. K3 ..... 7.75
Struthers, O. Y1 ..... 7.30
Warren, O. C17 ..... 7.30
Willimantic, Conn. J5 ..... 7.80
Waukegan, Ill. A7 ..... 7.30
Youngstown F3, Y1 ..... 7.30

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland, Md. (5) C19 ..... 6.55

BARS, Cold-Finished Alloy
Ambridge, Pa. W18 ..... 8.775
Beaver Falls, Pa. M12, R2 ..... 8.775
Bethlehem, Pa. B2 ..... 8.775
Bridgeport, Conn. C32 ..... 8.925
Buffalo B5 ..... 8.775
Camden, N.J. P13 ..... 8.95
Canton, O. T7 ..... 8.775
Carnegie, Pa. C12 ..... 8.775
Chicago W18 ..... 8.775
Cleveland A7, C20 ..... 8.775
Detroit B5, P17 ..... 8.975
Detroit S41 ..... 8.775
Donora, Pa. A7 ..... 8.775
Elyria, O. W8 ..... 8.775
Franklin Park, Ill. N5 ..... 8.775
Gary, Ind. R2 ..... 8.775
Green Bay, Wis. F7 ..... 8.775
Hammond, Ind. J5, L2 ..... 8.775
Hartford, Conn. R2 ..... 9.075
Harvey, Ill. B5 ..... 8.775
Lackawanna, N.Y. B2 ..... 8.775
Los Angeles P2, S30 ..... 10.75
Mansfield, Mass. B5 ..... 9.075
Massillon, O. R2, R8 ..... 8.775
Midland, Pa. C18 ..... 8.775
Monaca, Pa. S17 ..... 8.775
Newark, N.J. W18 ..... 8.95
Plymouth, Mich. P5 ..... 8.975
S. Chicago, Ill. W14 ..... 8.775
Spring City, Pa. K3 ..... 8.95
Struthers, O. Y1 ..... 8.775
Warren, O. C17 ..... 8.775
Waukegan, Ill. A7 ..... 8.775
Willimantic, Conn. J5 ..... 9.075
Worcester, Mass. A7 ..... 9.075
Youngstown F3, Y1 ..... 8.775

BARS, Reinforcing (To Fabricators)

AlabamaCity,Ala. R2 ..5.425
Atlanta A11 .....5.625
Birmingham C15 .....5.425
Buffalo R2 .....5.425
Cleveland R2 .....5.425
Ecorse,Mich. G5 .....5.775
Emeryville,Calif. J7 ..6.175
Fairfield,Ala. T2 .....5.425
Fairless,Pa. U5 .....5.575
Fontana,Calif. K1 .....6.125
Ft.Worth,Tex.(4)(26)T4 5.875
Gary,Ind. U5 .....5.425
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1 5.425
Johnstown,Pa. B2 .....5.425
Joliet,Ill. P22 .....5.425
KansasCity,Mo. S5 ...5.675
Kokomo,Ind. C16 .....5.525
Lackawanna,N.Y. B2 ..5.425
LosAngeles B3 .....6.125
Milton,Pa. M18 .....5.575
Minnequa,Colo. C10 ..5.875
Niles,Calif. P1 .....6.125
Pittsburg,Calif. C11 ..6.125
Pittsburgh J5 .....5.425
Portland,Oreg. O4 ..6.175
SandSprings,Okla. S5 ..5.925
Seattle B3, N14 .....6.175
S.Chicago,Ill. R2 .....5.425
S.Duquesne,Pa. U5 .....5.425
S.SanFrancisco B3 ..6.175
SparrowsPoint,Md. B2 ..5.425
Sterling,Ill.(1) N15 ..5.425
Sterling,Ill. N15 .....5.525
Struthers,O. Y1 .....5.425
Tonawanda,N.Y. B12 ..6.00
Torrance,Calif. C11 ..6.125
Youngstown R2, U5 ..5.425

BARS, Reinforcing (Fabricated; to Consumers)

Boston B2, U8 .....7.65
Chicago U8 .....6.91
Cleveland U8 .....6.89
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.08
KansasCity,Mo. S5 .....7.35
Lackawanna,N.Y. B2 ..6.85
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.55
Philadelphia U8 .....7.38
Pittsburgh J5, U8 .....7.10
SandSprings,Okla. S5 ...7.60
Seattle B3, N14 .....7.70
SparrowsPt.,Md. B2 ..7.08
St.Paul U8 .....7.92
Williamsport,Pa. S19 ..7.00

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 14.45
Economy,Pa.(D.R.)B14 18.00
Economy,(Staybolt)B14 18.45

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2 5.325
ChicagoHts.(4)(44) I-2 ..5.425
ChicagoHts.(4) C2 .....5.425
Franklin,Pa. (3) F5 ..5.325
Franklin,Pa. (4) F5 ..5.425
JerseyShore,Pa.(3) J8 ..5.30
Marion,O. (3) P11 .....5.325
Tonawanda(3) B12 ...5.325
Tonawanda(4) B12 .....6.00
Williamsport,Pa.(3) S19 5.50

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..4.925
Allenport,Pa. P7 .....4.925
Ashland,Ky.(8) A10 ..4.925
Cleveland J5, R2 .....4.925
Conshohocken,Pa. A3 ..4.975
Detroit(8) M1 .....5.025
Ecorse,Mich. G5 .....5.025
Fairfield,Ala. T2 .....4.925
Fairless,Pa. U5 .....4.975
Fontana,Calif. K1 .....5.675
Gary,Ind. U5 .....4.925
Geneva,Utah C11 .....5.025
GraniteCity,Ill(8) G4 ..5.125
Ind.Harbor,Ind. I-2, Y1 4.925
Irvin,Pa. U5 .....4.925
Lackawanna,N.Y. B2 ..4.925
Mansfield,O. E6 .....4.925
Munhall,Pa. U5 .....4.925
Newport,Ky.(8) A2 ..4.925
Niles,O. M21, S3 .....4.925
Pittsburg,Calif. C11 ..5.625
Pittsburgh J5 .....4.925
Portsmouth,O. P12 .....4.925
Riverdale,Ill. A1 .....4.925
Sharon,Pa. S3 .....4.925
S.Chicago,Ill. W14 .....4.925
SparrowsPoint,Md. B2 ..4.925
Steubenville,O. W10 ..4.925
Warren,O. R2 .....4.925
Weirton,W.Va. W6 .....4.925
Youngstown U5, Y1 ..4.925

SHEETS, H.R.(19) Ga. & Lighter)

Niles,O. M21 ..... 6.05

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.10
Ind.Harbor,Ind. Y1 .....8.10
Irvin,Pa. U5 .....8.10
Munhall,Pa. U5 .....8.10
Newport,Ky. A2 .....8.10
Youngstown U5, Y1 ..8.10

SHEETS, H.R.(14 Ga. & Heavier) High-Strength, Low-Alloy

Cleveland J5, R2 .....7.275
Conshohocken,Pa. A3 ..7.325
Ecorse,Mich. G5 .....7.375
Fairfield,Ala. T2 .....7.275
Fairless,Pa. U5 .....7.325
Farrell,Pa. S3 .....7.275
Fontana,Calif. K1 .....8.025
Gary,Ind. U5 .....7.275
Ind.Harbor,Ind. I-2, Y1 7.275
Irvin,Pa. U5 .....7.275
Lackawanna (35) B2 ..7.275
Munhall,Pa. U5 .....7.275
Pittsburgh J5 .....7.275
S.Chicago,Ill. U5, W14 7.275
Sharon,Pa. S3 .....7.275
SparrowsPoint(36) B2 ..7.275
Warren,O. R2 .....7.275
Weirton,W.Va. W6 .....7.275
Youngstown U5, Y1 ..7.275

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..5.175
Cleveland R2 .....5.675
Warren,O. R2 .....5.675

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....6.80
Middletown,O A10 .....6.55
Warren,O. R2 .....6.80

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.05
Allenport,Pa. P7 .....6.05
Cleveland J5, R2 .....6.05
Conshohocken,Pa. A3 ..6.10
Detroit M1 .....6.05
Ecorse,Mich. G5 .....6.15
Fairfield,Ala. T2 .....6.05
Fairless,Pa. U5 .....6.10
Follansbee,W.Va. F4 ..6.05
Fontana,Calif. K1 .....7.30
Gary,Ind. U5 .....6.05
GraniteCity,Ill. G4 .....6.25
Ind.Harbor,Ind. I-2, Y1 6.05
Irvin,Pa. U5 .....6.05
Lackawanna,N.Y. B2 ..6.05
Mansfield,O. E6 .....6.05
Middletown,O. A10 .....6.05
Newport,Ky. A2 .....6.05
Pittsburg,Calif. C11 ...7.00
Pittsburgh J5 .....6.05
Portsmouth,O. P12 .....6.05
SparrowsPoint,Md. B2 ..6.05
Steubenville,O. W10 ....6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 .....6.05
Yorkville,O. W10 .....6.05
Youngstown Y1 .....6.05

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2 .....8.975
Ecorse,Mich. G5 .....9.075
Fairless,Pa. U5 .....9.025
Fontana,Calif. K1 ....10.275
Gary,Ind. U5 .....8.975
IndianaHarbor,Ind. Y1 8.975
Irvin,Pa. U5 .....8.975
Lackawanna(37) B2 ..8.975
Pittsburgh J5 .....8.975
SparrowsPoint (38) B2 8.975
Warren,O. R2 .....8.975
Weirton,W.Va. W6 .....8.975
Youngstown Y1 .....8.975

SHEETS, Culvert	**Cu Steel**	**Cu Fe**
Ashland,Ky. A10	6.95	7.20
Canton,O. R2	6.95	7.45
Fairfield T2	6.95	7.20
Gary,Ind. U5	6.95	7.20
GraniteCity,Ill. G4	7.15	...
Ind.Harbor I-2	6.95	7.20
Irvin,Pa. U5	6.95	7.20
Kokomo,Ind. C16	7.05	...
MartinsFry. W10	6.95	7.20
Pitts.,Calif. C11	7.70	...
Pittsburgh J5	6.95	...
SparrowsPt. B2	6.95	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ..7.20

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2 ..6.60‡
Ashland,Ky. A10 .....6.60†
Canton,O. R2 .....6.60‡
Dover,O. E6 .....6.60†
Fairfield,Ala. T2 .....6.60†
Gary,Ind. U5 .....6.60†
GraniteCity,Ill. G4 ....6.80*
Ind.Harbor,Ind. I-2 ...6.60†
Irvin,Pa. U5 .....6.60†
Kokomo,Ind. C16 .....6.70‡
MartinsFerry,O. W10 ...6.60*
Middletown,O. A10 .....6.60†
Pittsburg,Calif. C11 ...7.35*
Pittsburgh J5 .....6.60†
SparrowsPt.,Md. B2 ..6.60†
Warren,O. R2 .....6.60†
Weirton,W.Va. W6 .....6.60*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana, Calif. K1 ... 7.175

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....9.725
SparrowsPt.(39) B2 ..9.725

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.00
Irvin,Pa. U5 .....7.00

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....6.85
Middletown,O. A10 .....6.85

SHEETS, Electrogalvanized

Cleveland (28) R2 ....7.425
Niles,O. (28) R2 ....7.425
Youngstown J5 .....7.275
Weirton,W.Va. W6 ....7.275

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) .9.25
Butler,Pa. A10 (type 2) .9.35

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.625
Cleveland R2 .....6.625
Fairfield,Ala. T2 .....6.625
Gary,Ind. U5 .....6.625
GraniteCity,Ill. G4 ....6.825
Ind.Harbor,Ind. I-2, Y1 6.625
Irvin,Pa. U5 .....6.625
Middletown,O. A10 .....6.625
Niles,O. M21, S3 .....6.625
Youngstown Y1 .....6.625

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ..8.65
Ind.Harbor,Ind. I-2 ..8.475
Yorkville,O. W10 .....8.475

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.00
Gary,Ind. U5 .....7.00
Mansfield,O. E6 .....7.00
Middletown,O. A10 .....7.00
Niles,O. M21, R2 S3....7.00
Weirton,W.VA. W6 .....7.00

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.40

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allengheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D3 Dearborn Div., Sharon Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md.Fine & Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W.Co.
N20 Neville Ferroalloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless Steel Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Div., H. K. Porter Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.925
Allenport,Pa. P7	4.925
Alton,Ill. L1	5.125
Ashland,Ky.(8) A10	4.925
Atlanta A11	5.125
Bessemer,Ala. T2	4.925
Birmingham C15	4.925
Buffalo(27) R2	4.925
Conshohocken,Pa. A3	4.975
Detroit M1	5.025
Ecorse,Mich. G5	5.025
Fairfield,Ala. T2	4.925
Fontana,Calif. K1	5.675
Gary,Ind. U5	4.925
Ind.Harbor,Ind. I-2, Y1	4.925
Johnstown,Pa.(25) B2	4.925
Lackaw'na,N.Y.(25) B2	4.925
LosAngeles(25) B3	5.675
Minnequa,Colo. C10	6.025
Riverdale,Ill. A1	4.925
SanFrancisco S7	6.35
Seattle(25) B3	5.925
Seattle N14	6.35
Sharon,Pa. S3	4.925
S.Chicago W14	4.925
S.SanFrancisco(25) B3	5.675
SparrowsPoint,Md. B2	4.925
Sterling,Ill.(1) N15	4.925
Sterling,Ill. N15	5.025
Torrance,Calif. C11	5.675
Warren,O. R2	4.925
Weirton,W.Va. W6	4.925
Youngstown U5	4.925

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.10
Farrell,Pa. S3	8.10
Gary,Ind. U5	8.10
Houston S5	8.35
Ind.Harbor,Ind. Y1	8.10
KansasCity,Mo. S5	8.35
LosAngeles B3	9.30
Lowellville,O. S3	8.10
Newport,Ky. A2	8.10
Sharon,Pa. A2, S3	8.10
S.Chicago,Ill. W14	8.10
Youngstown U5, Y1	8.10

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2	7.325
Conshohocken,Pa. A3	7.325
Ecorse,Mich. G5	7.425
Fairfield,Ala. T2	7.325
Farrell,Pa. S3	7.325
Gary,Ind. U5	7.325
Ind.Harbor,Ind. I-2, Y1	7.325
Lackawanna,N.Y. B2	7.325
LosAngeles(25) B3	8.075
Seattle(25) B3	8.325
Sharon,Pa. S3	7.325
S.Chicago,Ill. W14	7.325
S.SanFrancisco(25) B3	8.075
SparrowsPoint,Md. B2	7.325
Warren,O. R2	7.325
Weirton,W.Va. W6	7.325
Youngstown U5, Y1	7.325

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.175
Warren,O. R2	5.675

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.15
Baltimore T6	7.15
Boston T6	7.70
Buffalo S40	7.15
Cleveland A7, J5	7.15
Conshohocken,Pa. A3	7.20
Dearborn,Mich. D3	7.25
Detroit D2, M1, P20	7.25
Dover,O. G6	7.15
Ecorse,Mich. G5	7.25
Evanston,Ill. M22	7.25
Follansbee,W.Va. F4	7.15
Fontana,Calif. K1	9.00
FranklinPark,Ill. T6	7.25
Ind.Harbor,Ind. Y1	7.15
Indianapolis J5	7.30
LosAngeles J5	9.05
LosAngeles C1	9.20
NewBedford,Mass. R10	7.60
NewBritain(10) S15	7.15
NewCastle,Pa. B4, E5	7.15
NewHaven,Conn. D2	7.60
NewKensington,Pa. A6	7.15
Pawtucket,R.I. R3	7.80
Pawtucket,R.I. N8	7.70
Philadelphia P24	7.70
Pittsburgh J5	7.15
Riverdale,Ill. A1	7.25
Rome,N.Y.(32) R6	7.15
Sharon,Pa. S3	7.15
Trenton,N.J.(31) R5	8.60
Wallingford,Conn. W2	7.60
Warren,O. R2, T5	7.15
Weirton,W.Va. W6	7.15
Worcester,Mass. A7	7.70
Youngstown J5, Y1	7.15

STRIP, Cold-Rolled Alloy

Boston T6	15.40
Carnegie,Pa. S18	15.05
Cleveland A7	15.05
Dover,O. G6	15.05
Farrell,Pa. S3	15.05
FranklinPark,Ill. T6	15.05
Harrison,N.J. C18	15.05
Indianapolis J5	15.20
Lowellville,O. S3	15.05
Pawtucket,R.I. N8	15.40
Riverdale,Ill. A1	15.05
Sharon,Pa. S3	15.05
Worcester,Mass. A7	15.35
Youngstown J5	15.05

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.45
Dearborn,Mich. D3	10.60
Dover,O. G6	10.45
Ecorse,Mich. G5	10.60
Farrell,Pa. S3	10.50
Ind.Harbor,Ind. Y1	10.65
Sharon,Pa. S3	10.50
Warren,O. R2	10.45
Weirton,W.Va. W6	10.50
Youngstown Y1	10.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	7.90

STRIP, C.R. Electrogalvanized

Cleveland A7	7.15*
Dover,O. G6	7.15*
Evanston,Ill. M22	7.25*
Riverdale,Ill. A1	7.25*
Warren,O. B9, T5	7.15*
Worcester,Mass. A7	7.70*
Youngstown J5	7.15*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	7.275

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Riverdale,Ill. A1	5.50
Sharon,Pa. S3	5.35
Youngstown U5	5.35

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. D3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	...	....	12.90	16.10	19.30
Indianapolis J5	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles J5	11.15	12.60	14.80	....	....
NewBritain,Conn.(10) S15	8.95	10.40	12.60	15.60	18.55
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
New York W3	...	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	...	10.70	12.90	16.10	19.30
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown J5	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.10	21.95	26.30
Buffalo W12	18.10	....	....
Fostoria,O. S1	18.30	22.15	....
FranklinPark,Ill. T6	18.45	22.30	26.65
Harrison,N.J. C18	18.10	21.95	26.30
New York W3	18.10	21.95	26.30
Palmer,Mass. W12	18.10	....	....
Trenton,N.J. R5	18.10	21.95	26.30
Worcester,Mass. A7, T6	18.10	21.95	26.30
Youngstown J5	18.45	22.30	26.65

SILICON STEEL

H.R.SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	11.80	12.90	13.95
Mansfield,O. E6	9.625	11.10	11.80	12.90	13.95
Newport,Ky. A2	9.625	11.10	11.80	12.90	13.95
Niles,O. M21, S3	9.625	11.10	11.80	12.90	....
Vandergrift,Pa. U5	....	11.10	11.80	12.90	13.95
Warren,O. R2	9.625	11.10	11.80	12.90	....
Zanesville,O. A10	....	11.10	11.80	12.90	13.95

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.35	12.05	13.15	14.20
Brackenridge,Pa. A4	....	....	12.05	13.15	14.20
GraniteCity,Ill. G4	9.825*	11.05*	11.75*	12.85*	....
IndianaHarbor,Ind. I-2	9.625†	10.85*	11.55*	12.65*	....
Mansfield,O. E6	9.625*	11.35	12.05	13.15	14.20
Vandergrift,Pa. U5	9.625*	11.35	12.05	13.15	14.20
Warren,O. R2	9.625*	11.35	12.05	13.15	14.20
Zanesville,O. A10	....	11.35†	12.05	13.15	14.20
					Stator
Vandergrift,Pa. U5	....	....	....	....	7.85

H.R. SHEETS (22 Ga., cut lengths)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.00	15.55	16.05	17.10
Vandergrift,Pa. U5	15.00	15.55	16.05	17.10
Zanesville,O. A10	15.00	15.55	16.05	17.10

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	17.60	19.20	19.70	20.20	15.25††
Butler,Pa. A10	....	....	19.20	19.70	20.20	....
Vandergrift,Pa. U5	16.60	17.60	19.20	19.70	20.20	15.25**
Warren,O. R2	....	....	....	....	....	15.25‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower. ††Coils only

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.75	$9.00	$9.40
Fairfield,Ala. T2	8.85	9.10	9.50
Fairless,Pa. U5	8.85	9.10	9.50
Fontana,Calif. K1	9.50	9.75	10.15
Gary,Ind. U5	8.75	9.00	9.40
GraniteCity,Ill. G4	8.85	9.10	9.50
IndianaHarbor,Ind. I-2, Y1	8.75	9.00	9.40
Irvin,Pa. U5	8.75	9.00	9.40
Niles,O. R2	8.75	9.00	9.40
Pittsburg,Calif. C11	9.50	9.75	10.15
SparrowsPoint,Md. B2	8.85	9.10	9.50
Weirton,W.Va. W6	8.75	9.00	9.40
Yorkville,O. W10	8.75	9.00	9.40

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	7.725	7.925	....
Niles,O. R2	7.725	7.925	8.125

TIN PLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa.J5	$10.05	$10.30
Fairfield,Ala. T2	10.15	10.40
Fairless,Pa. U5	10.15	10.40
Fontana,Calif. K1	10.80	11.05
Gary,Ind. U5	10.05	10.30
Ind.Harb. Y1	10.05	10.30
Pitts.,Calif. C11	10.80	11.05
Sp.Pt.,Md. B2	10.15	10.40
Weirton,W.Va.W6	10.05	10.30
Yorkville,O. W10	10.05	10.30

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$7.85
Fairfield,Ala. T2	7.95
Fairless,Pa. U5	7.95
Fontana,Calif. K1	8.60
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. I-2,Y1	7.85
Irvin,Pa. U5	7.85
Niles,O. R2	7.85
Pittsburg,Calif. C11	7.85
SparrowsPoint,Md. B2	7.95
Weirton,W.Va. W6	7.85
Yorkville,O. W10	7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	$7.50
Gary,Ind. U5	7.50
GraniteCity,Ill. G4	7.60
Ind.Harbor,Ind. Y1	7.50
Irvin,Pa. U5	7.50
Yorkville,O. W10	7.50

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$9.70
Irvin,Pa. U5	9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary,Ind. U5	$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	7.65
Aliquippa,Pa. J5	7.65
Alton,Ill. L1	7.85
Atlanta A11	7.85
Bartonville,Ill. K4	7.75
Buffalo W12	7.65
Chicago W13	7.65
Cleveland A7, C20	7.65
Crawfordsville,Ind. M8	7.75
Donora,Pa. A7	7.65
Duluth A7	7.65
Fairfield,Ala. T2	7.65
Fostoria,O.(24) S1	7.75
Houston S5	7.90
Jacksonville,Fla. M8	8.00
Johnstown,Pa. B2	7.65
Joliet,Ill. A7	7.65
KansasCity,Mo. S5	7.90
Kokomo,Ind. C16	7.75
LosAngeles B3	8.60
Minnequa,Colo. C10	7.90
Monessen,Pa. P7, P16	7.65
N.Tonawanda,N.Y. B11	7.65
Palmer,Mass. W12	7.95
Pittsburg,Calif. C11	8.60
Portsmouth,O. P12	7.65
Rankin,Pa. A7	7.65
S.Chicago,Ill. R2	7.65
S.SanFrancisco C10	8.60
SparrowsPoint,Md. B2	7.75
Sterling,Ill.(1) N15	7.65
Sterling,Ill. N15	7.75
Struthers,O. Y1	7.65
Waukegan,Ill. A7	7.65
Worcester,Mass. A7	7.95

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	12.65
Buffalo W12	12.65
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	12.65
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	12.85
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	12.95
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	12.75
Struthers,O. Y1	12.65
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
NewHaven,Conn. A7	9.60
Palmer,Mass. W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester,Mass. A7	9.60

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Bartonville,Ill. K4	9.40
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Milbury,Mass.(12) N6	9.60
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
Muncie,Ind. I-7	9.50
Palmer,Mass.(12) W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester A7, J4, T6	9.60

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1	15.80
Bartonville,Ill. K4	15.70
Buffalo W12	15.60
Chicago W13	15.60
Cleveland A7	15.60
Crawfordsville,Ind. M8	15.70
Fostoria,O. S1	15.60
Houston S5	15.85
Jacksonville,Fla. M8	15.95
Johnstown,Pa. B2	15.60
KansasCity,Mo. S5	15.85
Kokomo,Ind. C16	15.60
Minnequa,Colo. C10	15.85
Monessen,Pa. P16	15.60
Muncie,Ind. I-7	15.80
Palmer,Mass. W12	15.90
S.SanFrancisco C10	16.45
Waukegan,Ill. A7	15.60
Worcester,Mass. A7, T6	15.90

ROPE WIRE (A)

Bartonville,Ill. K4	12.75
Buffalo W12	12.75
Fostoria,O. S1	12.75
Johnstown,Pa. B2	12.75
Monessen,Pa. P7	12.75
Muncie,Ind. I-7	12.95
Palmer,Mass. W12	13.05
Portsmouth,O. P12	12.75
Roebling,N.J. R5	13.05
SparrowsPt.,Md. B2	12.85
Struthers,O. Y1	12.75
Worcester,Mass. J4	13.05

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Tire Bead

Bartonville,Ill. K4	16.55
Monessen,Pa. P16	16.55
Roebling,N.J. R5	17.05

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	11.65
Baltimore T6	11.95
Boston T6	11.95
Buffalo W12	11.65
Chicago W13	11.75
Cleveland A7	11.65
Crawfordsville,Ind. M8	11.65
Dover,O. G6	11.65
Fostoria,O. S1	11.65
FranklinPark,Ill. T6	11.75
Kokomo,Ind. C16	11.65
Massillon,O. R8	11.65
Milwaukee C23	11.85
Monessen,Pa. P7, P16	11.65
Palmer,Mass. W12	11.95
Pawtucket,R.I. N8	11.95
Philadelphia P24	11.95
Riverdale,Ill. A1	11.75
Rome,N.Y. R6	11.65
Sharon,Pa. S3	11.65
Trenton,N.J. R5	11.95
Warren,O. B9	11.65
Worcester,Mass. A7, T6	11.95

NAILS, Stock

	Col.
AlabamaCity,Ala. R2	†173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla.(20) M8	184
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers; per cwt)

Galveston,Tex. D7	$9.10

NAILS, Cut (100 lb keg)
To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	175
Atlanta A11	177
Bartonville,Ill. K4	177
Crawfordsville,Ind. M8	177
Donora,Pa. A7	175
Duluth A7	175
Fairfield,Ala. T2	175
Houston S5	180
Jacksonville,Fla.(20) M8	186
Johnstown,Pa. B2	175
Joliet,Ill. A7	175
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	175
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)
Coil No. 3150

AlabamaCity,Ala. R2	$10.26
Atlanta A11	10.36
Bartonville,Ill. K4	10.36
Buffalo W12	10.26
Chicago W13	10.26
Crawfordsville,Ind. M8	10.36
Donora,Pa. A7	10.26
Duluth A7	10.26
Fairfield,Ala. T2	10.26
Houston S5	10.51
Jacksonville,Fla. M8	10.82
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	10.26
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	10.36
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	11.04
S.Chicago,Ill. R2	10.26
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill.(37) N15	10.36

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$10.60
Atlanta A11	10.70
Bartonville,Ill. K4	10.70
Buffalo W12	10.60
Chicago W13	10.60
Crawfordsville,Ind. M8	10.70
Donora,Pa. A7	10.60
Duluth A7	10.60
Fairfield,Ala. T2	10.60
Houston S5	10.85
Jacksonville,Fla. M8	11.16
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	10.60
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	10.70
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	11.40
S.Chicago,Ill. R2	10.60
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill.(37) N15	10.70

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$10.65
Atlanta A11	10.75
Bartonville,Ill. K4	10.75
Buffalo W12	10.65
Chicago W13	10.65
Crawfordsville,Ind. M8	10.75
Donora,Pa. A7	10.65
Duluth A7	10.65
Fairfield,Ala. T2	10.65
Houston S5	10.90
Jacksonville,Fla. M8	11.21
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	10.65
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	10.75
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	11.45
S.Chicago,Ill. R2	10.65
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill.(37) N15	10.75

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	219
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

Birmingham C15	172
ChicagoHts., Ill. C2, I-2	172
Duluth A7	172
Franklin,Pa. F5	172
Huntington,W.Va. C15	172
Johnstown,Pa. B2	172
Marion,O. P11	172
Minnequa,Colo. C10	177
Sterling,Ill.(1) N15	172
Tonawanda,N.Y. B12	174

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198*
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	203
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198††

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-14½ga. J5	190§
Atlanta A11	192*
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	197
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192††

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala. R2	17.15	18.70**
Aliq'ppa,Pa. J5	17.15	18.95
Bartonville K4	17.25	19.05
Cleveland A7	17.15	....
Crawf'dsville M8	17.25	19.05
Fostoria,O. S1	17.65	19.20†
Houston S5	17.40	18.95**
Jacksonville M8	17.50	19.30
Johnstown B2	17.15	18.95§
Kan.City,Mo. S5	17.40	....
Kokomo C16	17.25	18.80†
Minnequa C10	17.40	18.95**
P'lm'r,Mass.W12	17.45	19.00†
Pitts.,Calif. C11	17.50	19.05†
SparrowsPt. B2	17.25	19.05§
Sterling(37)N15	17.25	19.05††
Waukegan A7	17.15	18.70†
Worcester A7	17.45	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	8.65 9.20**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	8.75 9.425*
Bartonville(48) K4	8.75 9.425
Buffalo W12	8.65 9.20†
Cleveland A7	8.65 ....
Crawfordsville M8	8.75 9.425
Donora,Pa. A7	8.65 9.20†
Duluth A7	8.65 9.20†
Fairfield T2	8.65 9.20†
Houston(48) S5	8.90 9.45**
Jacks'ville,Fla. M8	9.00 9.675
Johnstown B2(48)	8.65 9.325§
Joliet,Ill. A7	8.65 9.20†
Kans.City(48) S5	8.90 9.45**
Kokomo C16	8.75 9.30†
LosAngeles B3	9.60 10.275§
Minnequa C10	8.90 9.45**
Monessen P7(48)	8.65 9.325§
Palmer,Mass. W12	8.95 9.50†
Pitts.,Calif. C11	9.60 10.15†
Rankin,Pa. A7	8.65 9.20†
S.Chicago R2	8.65 9.20**
S.SanFran. C10	9.60 10.15**
Spar'wsPt.B2(48)	8.75 9.425§
Sterling(48) N15	8.90 9.575††
Sterling(1) (48)	8.80 9.475††
Struthers,O. Y1	8.65 9.30†
Worcester,Mass.A7	8.95 9.50†

Based on zinc price of: *13.50. †5c. §10c. ‡Less than 10c. ††10.50c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts
Full Size Body (cut thread)
½ in. and smaller:
6 in. and shorter 49.0
Longer than 6 in. 39.0
⅝ in. thru 1 in.:
6 in. and shorter 39.0
Longer than 6 in. 35.0
1⅛ in. and larger:
All lengths 35.0
Undersized Body (rolled thread)
½ in. and smaller:
6 in. and shorter 49.0
Carriage, Machine, Lag Bolts
Hot Galvanized:
½ in. and smaller:
6 in. and shorter 29.0
Longer than 6 in. 15.0
⅝ in. and larger:
All lengths 12.0
Lag Bolts (all diam.)
6 in. and shorter 49.0
Longer than 6 in. 39.0
Plow and Tap Bolts
½ in. and smaller by 6 in. and shorter 49.0
Larger than ½ in. or longer than 6 in. 39.0
Blank Bolts 39.0
Step, Elevator, Tire Bolts 49.0
Stove Bolts, Slotted:
⅛ to ¼ in. incl.,
3 in. and shorter. 55.0
⅛ to ½ in., inclusive 55.0

NUTS

Reg. & Heavy Square Nuts:
All sizes 55.5
Square Nuts, Reg. &
Heavy, Hot Galvanized:
All sizes 41.0
Hex Nuts, Reg. &
Heavy, Hot Pressed:
¾ in. and smaller.. 60.5
⅞ in. to 1 in., incl. 55.5
1⅛ in. to 1½ in., incl. 58.5
1⅝ in. and larger.. 53.5
Hex Nuts, Reg. &
Heavy, Cold Punched:
¾ in. and smaller.. 60.5
⅞ in. to 1½ in., incl. 55.5
1⅝ in. and larger.. 53.5
Hex Nuts, All Types,
Hot Galvanized:
¾ in. and smaller.. 46.5
⅞ in. to 1 in., incl. 41.5
1⅛ in. to 1½ in., incl. 46.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):
¾ in. and smaller.. 60.5
⅞ in. to 1½ in., incl. 55.5
1⅝ in. and larger.. 53.5
Hex Nuts, Finished (Incl. Slotted and Castellated):
1 in. and smaller.. 63.0
1⅛ in. to 1½ in., incl. 59.0
1⅝ in. and larger.. 53.5
Semifinished Hex Nuts, Reg. (Incl. Slotted):
⅝ in. and smaller.. 60.5
¾ in. to 1 in., incl. 63.0
1⅛ in. to 1½ in., incl. 59.0
1⅝ in. and larger.. 53.5

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)
Hex Head Capscrews, Coarse or Fine Thread, Bright:
6 in. and shorter:
⅝ in. and smaller.. 40.0
¾, ⅞, and 1 in. diam. 22.0
Longer than 6 in.:
⅝ in. and smaller.. 8.0
¾, ⅞, and 1 in. diam. .... + 6.0
High Carbon, Heat Treated:
6 in. and shorter:
⅝ in. and smaller.. 26.0
¾, ⅞, and 1 in. diam. 3.0
Longer than 6 in.:
⅝ in. and smaller.. + 13.0
¾, ⅞, and 1 in. diam. .... + 32.0
Flat Head Capscrews:
¾ in. and smaller.. + 76.0
Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam.:
6 in. and shorter.. Net
Longer than 6 in... + 23

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in., larger 12.25
7/16 in. under: List less 19%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	25.98	23.54
1¼	13	....	30.78	23.36
1½	13	29.03	34.01	25.83
1¾	13	34.29	40.18	30.51
2	13	38.44	45.05	34.20
2¼	13	43.29	50.75	38.52
2¼	12	46.99	55.06	41.81
2½	12	51.76	60.65	46.05
2¾	12	56.04	65.67	49.88
3	12	59.76	70.03	53.19

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.525	5.425	....	6.50
Ensley,Ala. T2	5.525	5.425	....	6.50
Fairfield,Ala. T2	....	....	....	6.50
Gary,Ind. U5	5.525	5.425	....	....
Huntington,W.Va. C15	....	....	....	6.50
IndianaHarbor,Ind. I-2	5.525	5.425	5.475	....
Johnstown,Pa. B2	....	....	...(16)	6.50
Lackawanna,N.Y. B2	5.525	5.425	....	6.50
Minnequa,Colo. C10	5.525	5.425	....	7.00
Steelton,Pa. B2	5.525	5.425	....	....
Williamsport,Pa. S19	....	....	....	6.50

TIE PLATES

Fairfield,Ala. T2	6.60
Gary,Ind. U5	6.60
Ind.Harbor,Ind I-2	6.60
Lackawanna,N.Y. B2	6.60
Minnequa,Colo. C10	6.60
Seattle B3	6.75
Steelton,Pa. B2	6.60
Torrance,Calif. C11	6.75

JOINT BARS

Bessemer,Pa. U5	6.975
Fairfield,Ala. T2	6.975
Ind.Harbor,Ind. I-2	6.975
Joliet,Ill. U5	6.975
Lackawanna,N.Y. B2	6.975
Minnequa,Colo. C10	6.975
Steelton,Pa. B2	6.975

AXLES

Ind.Harbor,Ind. S13	8.775
Johnstown,Pa. B2	8.775

TRACK BOLTS, Untreated

Cleveland R2	14.75
KansasCity,Mo. S5	14.75
Lebanon,Pa. B2	14.75
Minnequa,Colo. C10	14.75
Pittsburgh P14	14.75
Seattle B3	15.25

SCREW SPIKES

Lebanon,Pa. B2	14.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	9.75
Ind.Harbor,Ind. I-2, Y1	9.75
KansasCity,Mo. S5	9.75
Lebanon,Pa. B2	9.75
Minnequa,Colo. C10	9.75
Pittsburgh J5	9.75
Seattle B3	10.25
S.Chicago,Ill. R2	9.75
Struthers,O. Y1	9.75
Youngstown R2	9.75

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.15c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.60c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 9.30c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Ambridge, Pa. N2	+9.25	....	+2.75	....	+0.25	....	1.25	....	1.25	....	1	....	3.5	....
Lorain, O. N3	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Youngstown Y1	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Alton, Ill. L1	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Benwood, W. Va. W10	4.5	+22	+7.5	+31	+18	+39.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Butler, Pa. F6	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Fairless, Pa. N3	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Fontana, Calif. K1	....	....	....	....	....	....	+8.25	+23.5	+5.25	+19.5	+1.75	+15	0.75	+14.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	4.25	+11	7.25	+7	10.75	+2.5	13.25	+3.25
Lorain, O. N3	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sharon, Pa. S4	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sparrows Pt., Md. B2	3.5	+23	+8.5	+32	+19	+40.5	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Wheatland, Pa. W9	5.5	+21	+6	+30	+17	+38.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Youngstown R2, Y1	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Alton, Ill. L1	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	....	....	....	....
Benwood, W. Va. W10	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Etna, Pa. N2	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Fairless, Pa. N3	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Fontana, Calif. K1	1.25	+13.25	1.75	+12.75	3.25	+13	3.25	+13	+7.25	+24	+7.25	+24
Indiana Harbor, Ind. Y1	13.75	+0.75	14.25	+0.25	15.75	+0.5	15.25	+0.5	5.25	+11.5	5.25	+11.5
Lorain, O. N3	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sharon, Pa. M6	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sparrows Pt., Md. B2	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Wheatland, Pa. W9	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Youngstown R2, Y1	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5

*Galvanized pipe discounts based on current price of zinc (10.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.00	27.00	....	36.00	40.00	42.00	44.25	48.50	45.00
202	23.75	30.25	36.50	39.00	40.75	43.00	45.00	49.25	49.25
301	23.25	28.00	37.25	37.25	42.00	44.25	46.25	51.25	47.50
302	25.25	31.50	38.00	40.50	42.75	45.00	47.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	49.50	57.00	57.00
303	....	32.00	41.00	46.00	45.50	48.00	50.00	56.75	56.75
304	27.00	33.25	40.50	44.25	45.25	47.75	50.75	55.00	55.00
304L	....	....	44.25	51.50	53.00	55.50	58.50	63.25	62.75
305	28.50	36.75	42.50	47.50	45.25	47.75	51.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	60.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	71.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	92.75	96.75	96.75
314	....	....	77.50	....	86.50	91.00	92.75	99.00	104.25
316	39.75	49.50	62.25	69.25	69.25	73.00	76.75	80.75	80.75
316L	....	55.50	70.00	76.50	77.00	80.75	84.50	89.25	88.50
317	48.00	60.00	76.75	88.25	86.25	90.75	93.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	59.75	65.50	65.50
330	....	....	106.75	....	95.25	106.75	105.50	108.00	149.25
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	69.75	79.25	79.25
403	....	....	32.00	....	35.75	37.75	40.25	48.25	48.25
405	19.50	25.50	29.75	36.00	33.50	35.25	37.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.00	33.75	35.00	40.25	40.25
416	....	....	28.75	....	32.50	34.25	36.00	48.25	48.25
420	26.00	33.50	34.25	41.75	39.25	41.25	45.25	52.00	62.00
430	17.00	21.75	28.75	32.00	32.50	34.25	36.00	40.75	40.75
430F	....	....	29.50	....	33.00	34.75	36.75	51.75	42.00
431	....	28.75	37.75	....	42.00	44.25	46.00	56.00	56.00
446	....	....	39.25	59.00	44.25	46.50	47.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless Steel Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels Inc.; U. S. Steel Corp.; Universal-Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel Co., subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless	....	....	....	....	37.50
302	34.70	37.95	42.25	46.70	39.75
304	36.90	40.55	45.10	49.85	....
304L	40.35	44.50	49.50	54.50	58.25
316	45.05	49.35	54.70	60.10	....
316L	47.30	53.80	61.45	69.10	....
316 Cb	36.60	40.05	44.60	49.30	47.25
321	38.25	42.40	47.55	52.80	57.00
347	28.60	29.85	33.35	36.85	....
405	28.15	29.55	33.10	36.70	....
410	28.30	29.80	33.55	37.25	....
430	48.90	59.55	70.15	80.85	....
Inconel	41.65	51.95	62.30	72.70	....
Nickel	41.95	52.60	63.30	74.15	....
Nickel, Low Carbon	43.35	53.55	63.80	74.05	....
Monel	....	....	....	....	46.00
Copper*					

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.95	40.25

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.305	Cr-Hot Work	0.475
Extra Carbon	0.360	W-Cr Hot Work	0.500
Special Carbon	0.475	V-Cr Hot Work	0.520
Oil Hardening	0.475	Hi-Carbon-Cr	0.925

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	....	4.285
18.25	4.25	1	4.75	....	2.500
18	4	2	9	....	2.870
18	4	2	....	....	1.960
18	4	1	....	....	1.795
9	3.5	....	....	....	1.395
13.5	4	3	....	....	2.060
13.75	3.75	2	5	....	2.440
6.4	4.5	1.9	....	5	1.300
6	4	3	....	6	1.545
1.5	4	1	....	8.5	1.155

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal transportation tax.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50‡	....	....
Birmingham U6	....	62.50‡	66.50	....
Woodward,Ala. W15	62.00**	62.50‡	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester,N.Y., deld.	69.02	69.52	70.02	....
Syracuse,N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago,Ill. R2	66.00	66.50	66.50	67.00
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon,Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,Ohio, deld.	69.12	69.62	69.62	70.12
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	68.00	68.50	69.00	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.50	76.00	....
Newark,N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
NevilleIsland,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks,Pa., deld.	....	67.60	67.60	68.13
Lawrenceville,Homestead, Wilmerding,Monaca,Pa., deld.	....	68.26	68.26	68.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	68.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard,Ohio Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	67.00
Mansfield,Ohio, deld.	70.90	....	71.40	71.90
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Everett,Mass. E1	67.50	68.00	68.50	....
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton,Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	68.50	69.00	....
Rockwood,Tenn. T3	....	62.50‡	66.50	....
Toledo,Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.54	73.04	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.
Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
Niagara Falls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry. $9 freight allowed K2	103.50
Keokuk,Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$78.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	78.50
Troy,N.Y. R2 (Phos. 0.035% max)	74.00
Philadelphia, deld.	82.67
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††°		Carbon	Floor
Atlanta	8.59§	9.86§	....	....	8.64	9.01	10.68	....	9.05	8.97	10.90
Baltimore	8.28	8.88	9.68	....	8.76	9.06	11.34#	15.18	9.19	8.66	10.14
Birmingham	8.18	9.45	11.07	....	8.23	8.60	10.57	....	8.64	8.56	10.70
Boston	9.38	10.44	11.45	53.50	9.42	9.73	12.90#	15.28	9.63	9.72	11.20
Buffalo	8.40	9.00	10.07	55.98	8.50	8.80	10.90#	15.00	8.90	8.90	10.45
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.20	9.45	10.10	53.00	8.23	8.60	8.80	14.65	8.64	8.56	9.88
Cincinnati	8.34	9.48	10.05	52.43	8.54	8.92	9.31	14.96	9.18	8.93	10.21
Cleveland	8.18	9.45	9.95	52.33	8.33	8.69	10.80#	14.74	9.01	8.79	10.11
Dallas	8.85	10.15	....	....	9.00	8.95	11.01	....	9.00	9.45	10.70
Denver	9.38	11.75	....	....	9.41	9.78	11.10	....	9.82	9.74	11.06
Detroit	8.43	9.70	10.45	56.50	8.58	8.90	9.15	14.91	9.18	8.91	10.13
Erie, Pa.	8.20	9.45	9.95[10]	....	8.50	8.75	9.05[10]	....	9.00	8.85	10.10
Houston	7.45	8.75	8.45	....	7.60	7.55	11.10	....	7.60	8.05	10.30
Jackson, Miss.	8.52	9.79	....	....	8.57	8.94	10.68	....	8.97	8.90	10.74
Los Angeles	8.50	10.75	11.65	57.60	8.55	8.55	12.00	....	8.60	8.55	9.95
Memphis, Tenn.	8.55	9.80	....	....	8.60	8.97	11.96#	....	9.01	8.93	10.56
Milwaukee	8.33	9.58	10.23	....	8.36	8.73	9.03	14.78	8.85	8.69	10.01
Moline, Ill.	8.55	9.80	10.35	....	8.58	8.95	9.15	....	8.99	8.91	....
New York	8.87	10.13	10.56	53.08	9.31	9.57	12.76#	15.09	9.35	9.43	10.71
Norfolk, Va.	8.40	....	....	....	9.10	9.10	12.00	....	9.40	8.85	10.35
Philadelphia	8.00	8.90	9.92	52.69	8.69	8.65	11.51#	15.01	8.50	8.77	9.77**
Pittsburgh	8.18	9.45	10.45	52.00	8.33	8.60	10.80#	14.65	8.64	8.56	9.88
Portland, Oreg.	8.50	11.20	11.55	57.38	9.55	8.65	14.50	15.95	8.65	8.30	11.50
Richmond, Va.	8.40	....	10.40	....	9.10	9.00	....	....	9.40	8.85	10.35
St. Louis	8.54	9.79	10.46	....	8.59	8.97	9.41	15.01	9.10	8.93	10.25
St. Paul	8.79	10.04	10.71	....	8.84	9.21	9.66	....	9.38	9.30	10.49
San Francisco	9.35	10.75	11.00	55.10	9.45	9.70	13.00	16.10	9.50	9.60	12.00
Seattle	9.95	11.15	12.00	57.38	10.00	10.10	14.05	16.35	9.80	9.70	12.10
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	9.95	11.15	12.00	57.38	10.00	10.10	14.05	17.20	9.80	9.70	12.10
Washington	8.88	....	....	....	9.36	9.56	10.94	....	9.79	9.26	10.74

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **⅛ in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.; #1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, Portland, Oreg. 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Portland, Oreg., 1000 to 9999 lb; [3]—400 to 9999 lb; [8]—1000 to 1999 lb; [8]—2000 to 3999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, Ohio, $138; Cutler, Utah, $165.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., $150; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N. J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa. Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Snow Shoe, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Snow Shoe, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-41; 70%, $36.40; 60%, $33-36.50. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $33-34; Mexican, all rail, duty paid, $25.25-25.75; barge, Brownsville, Tex., $27.25-27.75.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: Deld. east of Mississippi River, ocean bags 23,000 lb and over. F.o.b. Riverton or Camden, N. J., west of Mississippi River	10.50 9.50
Sponge Iron, Domestic, 98 + % Fe: Deld. east of Mississippi River, 23,000 lb and over	10.50
Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	28.00
Annealed, 99.5% Fe	36.50
Unannealed (99 + % Fe)	36.00
Unannealed (99 + % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500-lb drum, freight allowed: Carlots	39.50
Ton lots	41.50
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	30.30-45.70†
Bronze, 5000-lb lots	45.70-49.80†
Copper: Electrolytic	14.75*
Reduced	14.75*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.15
Nickel-Silver, 5000-lb lots	47.80-52.60†
Phosphor-Copper, 5000-lb lots	57.80
Copper (atomized) 5000-lb lots	38.30-46.80‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.07
Stainless Steel, 316	$1.26
Tin	14.50*
Zinc, 5000-lb lots	17.50-30.70‡

Tungsten:	Dollars
Melting grade, 99% 60 to 200 mesh: 1000 lb and over	3.15
Less than 1000 lb	3.30
Chromium, electrolytic 99.8% Cr min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Length	Per 100 lb
2	24	$60.75
2½	30	39.25
3	40	37.00
4	40	35.00
5⅛	40	34.75
6	60	31.50
7	60	28.25
8, 9, 10	60	28.00
12	72	26.75
14	60	26.75
16	72	25.75
17	60	26.25
18	72	26.25
20	72	25.25
24	84	26.00

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries.)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.88	$5.42	$5.42	$5.78
Bar Size Angles	5.77	5.65	5.65	5.95
Structural Angles	5.77	5.65	5.65	5.95
I-Beams	5.72	5.60	5.60	6.02
Channels	5.72	5.60	5.60	6.02
Plates (basic bessemer)	7.64	7.59	7.64	7.88
Sheets, H.R.	8.25	8.20	8.20	8.50
Sheets, C.R. (drawing quality)	9.00	8.95	8.95	9.25
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	26.20	26.20	26.20	27.05
Barbed Wire (†)	6.95	6.95	6.95	7.40
Merchant Bars	6.37	6.32	6.37	6.61
Hot-Rolled Bands	7.20	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	6.73	6.73	6.73	7.13
Wire Rods, O.H. Cold Heading Quality No. 5	7.07	7.07	7.07	7.47
Bright Common Wire Nails (§)	8.12	8.12	8.12	8.32

†Per 82 lb, net, reel. §Per 100-lb kegs, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1958 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	25.00
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	27.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$12.00-12.50*
Domestic, concentrates f.o.b. milling points	20.00

*Before duty.

Manganese Ore

Mn 46-48%, Indian (export tax included), $135 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; other than Indian, nominal; contracts by negotiation.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$50.00
48% 2.8:1	48.00
48% no ratio	39.00

South African Transvaal

48% no ratio	$37.00
44% no ratio	27.00

Turkish

48% 3:1	$55.00

Domestic

Rail nearest seller

18% 3:1	39.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.60
60-65%	2.60-2.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.75
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	31.84
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, Mich., deld.	32.25
Saginaw, Mich., deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens: New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, Ohio, ovens	29.00
Cincinnati, deld.	31.84
Kearny, N. J., ovens	29.75
Milwaukee, ovens	30.50
Neville Island (Pittsburgh), Pa., ovens	29.25
Painesville, Ohio, ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
St. Paul, ovens	29.75
Chicago, deld.	33.29
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

*Or within $4.85 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg	29.50
Industrial xylene	32.00-34.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00-34.00

Cents per pound, producing point

Phenol: Grade 1, 17.50; Grade 2-3, 15.50; Grade 4, 17.50; Grade 5, 16.50; Grade 6, 14.50.

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Launching Pad paved with Harbison-Walker Castable Refractory

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Neville Island, Pa., 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton; $245, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively. (Mn 79-81%). Lump $253 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2% from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38.43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Ton lot, add 3.5c; less ton, add 5.2c. Delivered.
Cr 67.71%, carload, lump, bulk, C 0.02% max, 41.00c per lb contained Cr; 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Ton lot, add 3.4c; less ton lot, add 5.1c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 30.05c per lb of contained Cr. Packed, c.l. 31.65c, ton 33.45c, less ton 34.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8M x D, 21.25c, per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" down, 27.50c per lb contained Cr, 14.20c per lb contained Si. 0.75" x down, 28.65c per lb contained Cr, 14.20c per lb contained Si. Delivered.

Chromium Metal Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed ¼" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si, 8% max, C 3½ max). Contract, any quantity, $3.30 per lb of contained V. Delievered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C, 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 14.20c per lb of contained Si. Packed c.l. 16.70c, ton lot 18.15c, less ton 19.80c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 22.00c per lb of Si. Packed, c.l. 23.65c, ton lot 24.95c, less ton 25.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carload 9.50c per lb f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3⅜ lb each and containing 2 lb of Cr). Contract, carload, bulk 19.60c per lb of briquet, carload packed in box pallets 19.80c, in bags 20.70c; 3000 lb to c.l. in box pallets 21.00c; 2000 lb to c.l. in bags, 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l., bags, 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c, 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.7c per lb of briquet; packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l., bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c; (Small size—weighing approx 2½ lb and containing 1 lb of Si.) Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l., pallets 9.65c; 2000 lb to c.l., bags, 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.95 per lb of contained W; 2000 lb W to 5000 lb W, $3.05; less than 2000 lb W, $3.17. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Ton lots 2" x D, $4.25 per lb of contained Cb; less ton lots, $4.30. Delivered.

Ferrotantalum—Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $3.70 per lb of contained Cb plus Ta, delivered; less ton lot $3.75.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5.7%, Fe 20% approx). Contract, c.l. packed ½-in. x 12 M 20.00c per lb of alloy, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $110 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa. $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.

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Scrap Loses Some of Its Steam

STEEL's composite on the prime grade slips to $36.83, off 34 cents, after holding steady for three weeks. Lack of strong demand from steel mills being felt

Scrap Prices, Page 150

Chicago—Influenced by slow demand and depressed steelmaking operations over the next few weeks, a number of important grades of scrap are off from $1 to $2 a ton. Cast iron scrap, though, is higher.

No new mill buying has appeared, and prospects are that March will turn out to be a quiet month.

Pittsburgh — Leading grades of scrap are showing signs of weakness because no early stepup in steelmaking operations is indicated. Brokers say it's hard to buy and sell. There's reluctance on the part of dealers to sell at present price levels, and mills are disinclined to place orders. Price changes last week were minor, with railroad grades moderately stronger.

Philadelphia — Domestic delivered prices on the major grades of steel scrap are unchanged, with the market being sustained principally by export demand. The only steel grade price change is in rail crops, 2 ft and under, which are slightly stronger at $59-$60, delivered.

New York—No. 1 heavy melting and No. 1 bundles are easier at $33-$34, and No. 2 bundles at $22-$23. Domestic demand is quiet and were it not for a continued fair amount of export business brokers' buying prices would be lower. Brokers have advanced their prices on heavy breakable $1 a ton to $33-$34. Prices on other grades of scrap are unchanged.

Boston — Available for district shipment are No. 1 heavy melting at $30, brokers' buying price, and No. 2 heavy melting at $29. But there is little buying at those prices which are too high for eastern Pennsylvania delivery. For mills in that area, no better than $27 and $25 are being paid, and New England dealers are unwilling to sell at those figures.

Cleveland—Except for a purchase of electric furnace material by a Valley mill, the scrap market lacks significant developments. The Valley purchase was a couple dollars under one made at the opening of the month by another mill. Generally, the market continues easy, with prices largely nominal and pointing toward the weak side.

Detroit—A Canadian purchase boosted prices on No. 1 steel in this market; otherwise, trading has been inactive. Local dealers apparently are trying to hold sales back in an effort to capitalize on the speculative buying they've been doing in recent weeks.

Buffalo—Cast iron scrap continues to provide a bright spot in the local market. Foundries are buying steadily; persistent demand and relatively short supplies have pushed prices up another $2 a ton. Cupola cast is quoted at $43 and

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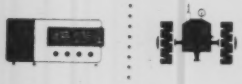

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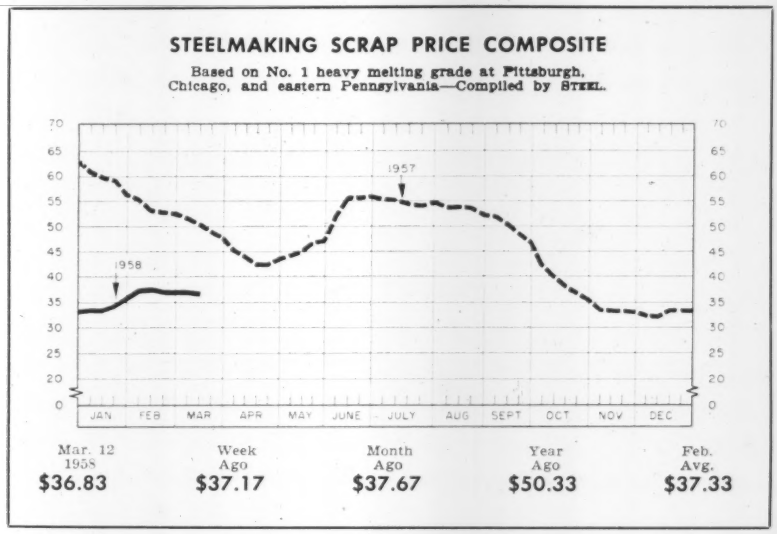

STEELMAKING SCRAP PRICE COMPOSITE
Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania—Compiled by STEEL.
1957
1958
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
Mar. 12 1958 $36.83
Week Ago $37.17
Month Ago $37.67
Year Ago $50.33
Feb. Avg. $37.33

Low phos material has been showing more life in this market, with consumers offering $37 to $38 for plates and structurals, 2 ft and under. Specialties appear to be edging higher, but mill grades remain depressed.

Cincinnati—The market appears to be stable. Brokers are filling mill orders and are meeting less price resistance from dealers than they did a month ago. Scrap is moving into dealer yards at a better pace as the flow of country material picks up.

St. Louis—Prices are unchanged on the low volume of material moving. One major buyer has offered $2 to $4 a ton over the going price for No. 2 melting steel and bundles for a limited, identified tonnage by barge from distant points. The offer did not set a firm new local price.

Birmingham—Last week No. 2 open-hearth steel sold here at $2.60 a ton above the price last paid by an Atlanta mill. Purchases of some electric furnace grades also were made at higher prices. A railroad list quoted some items up. The cast iron market is firm. Exports are sluggish, but one boat is loading at a Florida port.

Houston—Both Texas steel mills are out of the market this month, and Gulf Coast exports are dormant. Scrap prices are tending toward the weak side.

Orders placed last month extend through Mar. 31, and brokers have moved slowly in covering them. Inclement weather has prevented yard stocks from piling up, a factor that supports prices.

Seattle—In anticipation of stronger demand, steel scrap prices advanced last week in this market. No. 1 heavy melting is quoted at $30. Turnover is small, and dealers are marking time, awaiting revival of mill buying.

Los Angeles—Lack of consuming interest continues to make posted scrap prices meaningless. Earlier predictions of a market upturn in March are not being borne out.

San Francisco—Steel scrap continues to move slowly in this market. Despite current sluggishness, the trade anticipates more activity, possibly beginning at the start of April.

Pig Iron . . .

Pig Iron Prices, Page 143

Production of pig iron is being reduced further as demand continues to lag. With few exceptions, gray iron and malleable foundries are melting at no more than 50 per cent of capacity in most districts. They are maintaining small inventories of iron and are buying only to meet immediate needs.

In New England, machine tool and paper mill equipment producers are ordering castings lightly since demand for their products is low. Mechanized textile shops are holding operations somewhat under 60 per cent. To do so, most of the shops are engaged in jobbing work at prices which most independent job shops cannot meet.

The Lackawanna, N. Y., plant of Bethlehem Steel Co. banked four of its seven blast furnaces because its mill is using considerably less hot metal in its open hearths.

One of the two stacks at Swedeland, Pa., was blown out last week.

Imports are at a virtual standstill. Some Spanish iron of bessemer-malleable quality is being offered on the East Coast, but sales are light.

Warehouse . . .

Warehouse Proces, Page 143

General steel distributors in the East are less confident than they were that March business will exceed the February volume. March will have more working days, but they doubt the daily rate will average quite as high. First quarter volume will fall short of expectations.

Since last fall the number of orders has been tending downward, and that still is the pattern. Compared with the rate of bookings last year, total volume so far this year is off about 50 per cent—a close parallel to steel ingot production. Individual orders now average about 1000 lb, about half of those of a year ago. Curiously, for some warehouses in the Chicago district, as much as 80 per cent of a day's orders are placed after 2 p.m., a condition that creates intense late afternoon activity to get the material on its way.

Normally, hand-to-mouth buying for prompt shipment should operate to the advantage of distributors. In effect, most mills are taking smaller mixed orders for early delivery; this tonnage usually goes to warehouses. Mill shipments to

(*Please turn to Page* 155)

Stands to reason . . . owner operation logically assures you a more personal attention to your comfort and convenience. Baltimore's best.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Mar. 12, 1958. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 12	$36.83
Mar. 5	37.17
Feb. Avg.	37.33
Mar. 1957	49.63
Mar. 1953	44.05

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	33.00-34.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	*29.00-30.00*
No. 1 busheling	36.00-37.00
No. 1 factory bundles	*41.00-42.00*
Machine shop turnings	17.00-18.00
Mixed borings, turnings	17.00-18.00
Short shovel turnings	21.00-22.00
Cast iron borings	21.00-22.00
Cut structurals:	
2 ft and under	*41.00-42.00*
3 ft lengths	*40.00-41.00*
Heavy turnings	35.00-36.00
Punchings & plate scrap	*40.00-41.00*
Electric furnace bundles	*40.00-41.00*

Cast Iron Grades

No. 1 cupola	40.00-41.00
Stove plate	40.00-41.00
Unstripped motor blocks	26.00-27.00
Clean auto cast	42.00-43.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	*41.00-42.00*
Rails, 2 ft and under	*57.00-58.00*
Rails, 18 in. and under	*58.00-59.00*
Angles, splice bars	*50.00-51.00*
Rails, rerolling	*60.00-61.00*

Stainless Steel Scrap

18-8 bundles & solids	165.00-175.00
18-8 turnings	85.00-90.00
430 bundles & solids	100.00-110.00
430 turnings	50.00-55.00

CHICAGO

No. 1 heavy melt., indus.	*36.00-37.00*
No. 1 hvy melt., dealer	*34.00-35.00*
No. 2 heavy melting	*32.00-33.00*
No. 1 factory bundles	*39.00-40.00*
No. 1 dealer bundles	*35.00-36.00*
No. 2 bundles	*26.00-27.00*
No. 1 busheling, indus.	*36.00-37.00*
No. 1 busheling, dealer	*34.00-35.00*
Machine shop turnings	*20.00-21.00*
Mixed borings, turnings	*22.00-23.00*
Short shovel turnings	*22.00-23.00*
Cast iron borings	*22.00-23.00*
Cut structurals, 3 ft	*43.00-44.00*
Punchings & plate scrap	*44.00-45.00*

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	38.00-39.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	*48.00-49.00*
Drop broken machinery	*48.00-49.00*

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
R.R. malleable	53.00-54.00
Rails, 2 ft and under	54.00-55.00
Rails, 18 in. and under	55.00-56.00
Angles, splice bars	51.00-52.00
Axles	*56.00-57.00*
Rails, rerolling	*55.00-56.00*

Stainless Steel Scrap

18-8 bundles & solids	160.00-165.00
18-8 turnings	85.00-95.00
430 bundles & solids	90.00-100.00
430 turnings	47.50-52.50

YOUNGSTOWN

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	25.00-26.00
No. 1 busheling	37.00-38.00
No. 1 bundles	37.00-38.00
No. 2 bundles	24.00-25.00
Machine shop turnings	13.00-14.00
Short shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	39.00-40.00
Electric furnace bundles	39.00-40.00

Railroad Scrap

No. 1 R.R. heavy melt.	*41.00-42.00*

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	21.00-22.00
No. 1 factory bundles	37.00-38.00
No. 1 bundles	*32.50-33.50*
No. 2 bundles	23.00-24.00
No. 1 busheling	33.00-34.00
Machine shop turnings	11.00-12.00
Short shovel turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut foundry steel	37.00-38.00
Cut structurals, plates 2 ft and under	44.00-45.00
Low phos. punchings & plate	35.00-36.00
Alloy free, short shovel turnings	19.00-20.00
Electric furnace bundles	*34.50-35.50*

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	36.00-37.00
Heavy breakable cast	36.00-37.00
Stove plate	43.00-44.00
Unstripped motor blocks	26.00-27.00
Brake shoes	34.00-35.00
Clean auto cast	45.00-46.00
Burnt cast	33.00-34.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	60.00-61.00
Rails, 2 ft and under	57.00-58.00
Rails, 18 in. and under	58.00-59.00
Rails, random lengths	50.00-51.00
Cast steel	47.00-48.00
Railroad specialties	51.00-52.00
Uncut tires	41.00-42.00
Angles, splice bars	51.00-52.00
Rails, rerolling	56.00-57.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	33.00
No. 2 heavy melting	30.00
No. 1 bundles	33.00
No. 2 bundles	25.00
No. 1 busheling	33.00
Machine shop turnings	18.00
Short shovel turnings	20.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	33.00
Heavy breakable cast	33.00
Unstripped motor blocks	33.00
Clean auto cast	45.00
Stove plate	41.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00
Rails, 18 in. and under	56.00
Rails, random lengths	50.00
Rails, rerolling	*56.00*
Angles, splice bars	49.00

BIRMINGHAM

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 bundles	*33.00-34.00*
No. 2 bundles	*22.00-23.00*
No. 1 busheling	*33.00-34.00*
Cast iron borings	12.00-13.00
Machine shop turnings	24.00-25.00
Short shovel turnings	25.00-26.00
Bar crops and plates	40.00-41.00
Structurals & plates	38.00-39.00
Electric furnace bundles	*37.00-38.00*
Electric furnace:	
2 ft and under	*37.00-38.00*
3 ft and under	*36.00-37.00*

Cast Iron Grades

No. 1 cupola	50.00-51.00
Stove plate	49.00-50.00
Unstripped motor blocks	40.00-41.00
Charging box cast	22.00-23.00
No. 1 wheels	*39.00-40.00*

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 18 in. and under	49.00-50.00
Rails, rerolling	*52.00-53.00*
Rails, random lengths	*45.00-46.00*
Angles, splice bars	*43.00-44.00*

PHILADELPHIA

No. 1 heavy melting	38.50
No. 2 heavy melting	35.00
No. 1 bundles	38.50
No. 2 bundles	28.00
No. 1 busheling	38.50
Electric furnace bundles	40.00
Mixed borings, turnings	22.50†
Short shovel turnings	23.00†
Machine shop turnings	21.00†
Heavy turnings	34.00†
Structurals & plate	43.00-44.00
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	*59.00-60.00*

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	*43.00†*
Malleable	*62.00*
Drop broken machinery	50.00

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	29.00-30.00
No. 1 bundles	*33.00-34.00*
No. 2 bundles	*22.00-23.00*
Machine shop turnings	11.00-12.00
Mixed borings, turnings	12.00-13.00
Short shovel turnings	14.00-15.00
Low phos. (structurals & plate)	Nominal

Cast Iron Grades

No. 1 cupola	35.00-36.00
Unstripped motor blocks	32.00
Heavy breakable	*33.00-34.00*

Stainless Steel

18-8 sheets, clips, solids	*155.00-160.00*
18-8 borings, turnings	*55.00-60.00*
410 sheets, clips, solids	60.00-65.00
430 sheets, clips, solids	75.00-80.00

BUFFALO

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 2 bundles	23.00-24.00
No. 1 busheling	28.00-29.00
Mixed borings, turnings	14.00-15.00
Machine shop turnings	12.00-13.00
Short shovel turnings	15.00-16.00
Cast iron borings	14.00-15.00
Low phos. structurals and plate, 5 ft and under	*33.00-34.00*
2 ft and under	*37.00-38.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*42.00-43.00*
No. 1 machinery	*47.00-48.00*

Railroad Scrap

Rails, random lengths	47.00-48.00
Rails, 3 ft and under	53.00-54.00
Railroad specialties	37.00-38.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	28.50-29.50
No. 1 bundles	32.00-33.00
No. 2 bundles	*24.00-25.00*
No. 1 busheling	32.00-33.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	*16.00-17.00*
Short shovel turnings	19.00-20.00
Cast iron borings	15.00-16.00
Low phos. 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	40.00-41.00
Heavy breakable cast	33.00-34.00
Charging box cast	33.00-34.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	*36.00-37.00*
Rails, 18 in. and under	54.00-55.00
Rails, random lengths	44.00-45.00

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	*37.00*
No. 2 heavy melting	*34.00*
No. 2 bundles	*26.00*
Crushed turnings	*23.00*
Machine shop turnings	*19.50-20.00*
Low phos. plates, structurals	*40.00-41.00*

Cast Iron Grades

No. 1 cupola	*40.00-41.00*
Heavy breakable	*30.00-31.00*
Unstripped motor blocks	*30.00-32.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00*

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00
No. 2 heavy melting	22.00
No. 1 bundles	29.00
No. 2 bundles	17.00
No. 1 busheling	29.00
Machine shop turnings	9.50-10.00†
Mixed borings, turnings	9.50-10.00
Short shovel turnings	11.00-11.50†
No. 1 cast	29.00-30.00
Mixed cupola cast	28.00-29.00
No. 1 machinery cast	35.00-36.00

†Nominal

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	*33.00-34.00*
No. 2 bundles	20.00-21.00
No. 1 busheling	*32.00-33.00*
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Short shovel turnings	12.00-13.00
Punchings & plate	*30.00-31.00*

Cast Iron Grades

No. 1 cupola	37.00-38.00
Stove plate	31.00-32.00
Charging box cast	29.00-30.00
Heavy breakable	31.00-32.00
Unstripped motor blocks	21.00-22.00
Clean auto cast	39.00-40.00

SEATTLE

No. 1 heavy melting	*30.00*
No. 2 heavy melting	*28.00*
No. 1 bundles	*24.00*
No. 2 bundles	*23.00*
Machine shop turnings	*16.00*
Mixed borings, turnings	*16.00*
Electric furnace No. 1	38.00

Cast Iron Grades

No. 1 cupola	31.00
Heavy breakable cast	28.00
Unstripped motor blocks	23.00
Stove plate (f.o.b. plant)	21.00

LOS ANGELES

No. 1 heavy melting	32.00
No. 2 heavy melting	30.00
No. 1 bundles	28.00
No. 2 bundles	20.00
Machine shop turnings	9.00
Shoveling turnings	11.00
Cast iron borings	10.00
Cut structurals and plate 1 ft and under	43.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	22.00
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Short shovel turnings	15.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

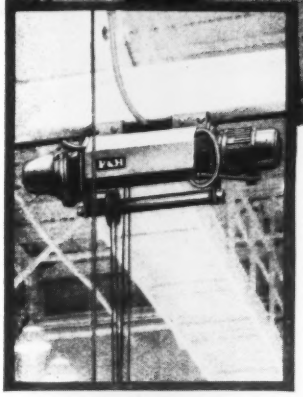
HAMILTON, ONT.

No. 1 heavy melting	32.00
No. 2 heavy melting	28.00
No. 1 bundles	32.00
No. 2 bundles	25.00
Mixed steel scrap	27.00
Mixed borings, turnings	17.00
Busheling, new factory: Prepared	32.00
Unprepared	26.00
Short steel turnings	21.00

Cast Iron Grades†

No. 1 machinery cast	45.00-50.00

†F.o.b. Hamilton, Ont.



P&H Hevi-Lift Hoists speed assembly of first Douglas DC-8 Jet Transport

It takes precision control of lifting and lowering to position the heavy DC-8 fuselage for joining to the wings. Douglas gets it by using two P&H Hevi-Lift® Hoists.

You can't beat a Hevi-Lift, when it comes to fast response for precise inching and spotting. The RCD brake—found only on a Hevi-Lift—is the reason why.

It's a mill-type brake like those used on big overhead cranes. It has no linkage, no laminations, and only one simple point of adjustment. Total brake movement is only 1/32 of an inch.

There are other advantages in using Hevi-Lifts (capacities 1,000 to 40,000 lbs.) — maintenance costs that are as much as 50% lower than usual, for example. Write for Bulletin H-5 to Dept. 202E, Harnischfeger Corp., Milwaukee 46, Wisconsin.

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Diecasting Sales Down

Slump in autos and appliances is chiefly responsible for an average 25 per cent dip in shipments. Zinc sales off in February. Copper price still in danger

Nonferrous Metal Prices, Pages 154 & 155

SHIPMENTS of aluminum and zinc diecastings are running an average of 25 per cent under year-ago levels.

The ailing auto industry, the largest consumer of diecastings, is the culprit. But diecasters without any auto ties are down, too. Reason: Such large customers as appliances, office machines, and hand tools aren't in a buying mood.

Forecast—Last year, diecasters produced 188,250 tons of aluminum castings and 351,000 tons of zinc castings, says the American Die Casting Institute, New York. This year the ADCI predicts the industry will turn out 197,500 tons of aluminum and 347,000 tons of zinc castings (assuming production of 5.2 million passenger cars).

Many diecasters aren't so optimistic. Slack sales and a possible auto strike make a 5.2 million car year doubtful, they say.

Aluminum—January shipments of primary ingots to diecasters were off 12 per cent from the year-ago period. One bright spot: The average 1957 model auto sported 30.4 lb of aluminum diecastings. The 1958s use 36.1 lb.

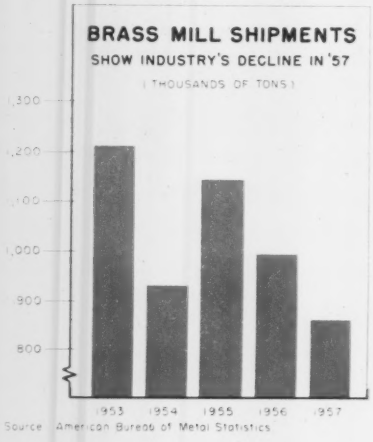
Zinc—Producer shipments to diecasters are down. By Mar. 1 last year, 58,493 tons of special high grade zinc had been produced. This year the figure was down to 52,510 tons. Even more significant: Stocks stood at 27,155 tons on Mar. 1, 1957, compared with 52,263 tons at the same time this year.

Here's a rundown on diecasting sales in five major cities:

Cleveland—Accurate Die Casting Co. says aluminum sales are down 20 per cent, zinc sales, 50 per cent. Precision Castings Co. reports deliveries of both aluminum and zinc castings are running 40 per cent under those in 1957's first quarter. One Cleveland firm says its shipments are 5 to 7 per cent higher.

Chicago—Logan Industries says sales of aluminum and zinc castings are down 40 per cent from what they were a year ago. National Diecasting Co. reports its aluminum and zinc sales are 10 per cent under 1957 levels.

Detroit—General Die Casting Co. reports sales of zinc castings are off 25 per cent from last year's. Detroit Die Casting & Plating Co. is shut down temporarily.



Source: American Bureau of Metal Statistics

Pittsburgh—A. W. Francis Co. says its zinc sales "compare favorably with those of previous years." Pittsburgh Die & Casting Co. reports a slump in aluminum and zinc casting sales, especially to the coal mining equipment industry.

New York—Mt. Vernon Die Casting Co. says aluminum casting sales are off 25 per cent, zinc a little less. Another New York diecaster says sales are down, but he looks for an upturn in April. Consensus: The second quarter will be about the same as the first.

Copper Market Quiet

Custom smelters picked up some orders for March delivery immediately after lowering their price to 23 cents a pound, but business has slowed down since.

If concentrates begin to stack up, custom smelters will probably be forced to trim the quotation again. Primary producers remain quiet on their price plans. Consensus: They eventually will have to come down by at least 1 cent a lb.

A sign of copper's weakness is Kennecott Copper Corp.'s decision to trim domestic output by 12.5 per cent. This brings the company's announced U. S. curtailments to around 78,000 tons a year.

Zinc Shipments Off

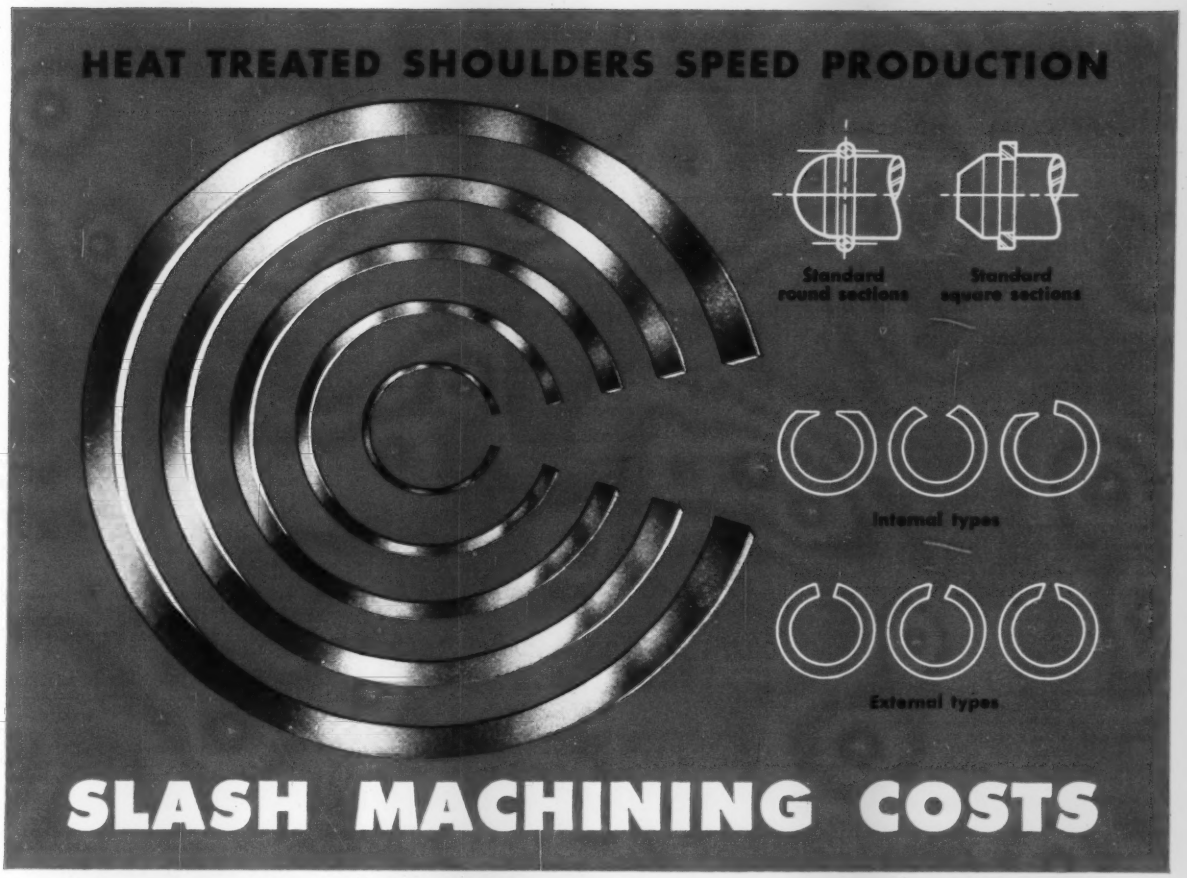
February statistics from the American Zinc Institute Inc. are both good and bad. On the plus side, it looks like the production curtailments are finally beginning to be felt. Slab zinc smelter output registered 68,354 tons in February, compared with 82,343 tons the previous month.

Not so encouraging are total shipments, which dropped to 59,511 tons, compared with 68,657 tons in January. Both months are well behind the corresponding period of 1957.

NONFERROUS PRICE RECORD

	Mar. 5 Price	Last Change	Previous Price	Feb. Avg	Jan. Avg	Mar., 1957 Avg
Aluminum	26.00	Aug. 1, 1957	25.00	26.000	26.000	25.000
Copper	23.00–25.00	Feb. 26, 1958	23.125–25.00	24.298	25.135	31.462
Lead	12.80	Dec. 2, 1957	13.30	12.800	12.800	15.800
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	95.25	Mar. 12, 1958	95.75	93.818	92.933	99.683
Zinc	10.00	July 1, 1957	10.50	10.000	10.000	13.500

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. shipping point; MAGNESIUM, pig, 99.8%, Velasco, Tex.



EATON-RELIANCE Snap Rings

Machining costs CAN be reduced without reducing product quality. This is specifically true where Eaton-Reliance Snap Rings are used instead of machined shoulders on shafts and in counterbores. Design and industrial engineers save production man hours as well as valuable material. How? Eaton-Reliance Snap Rings allow shafts to be ordered to size rather than oversize. The metal taken from the small groove required for the snap ring is negligible compared to the amount wasted machining an entire shaft. The time it takes to machine a groove is only a fraction of that needed to fully machine a shaft either externally or internally.

These time and material savings add up to dollars.

Eaton-Reliance Snap Rings are being used successfully in industry throughout the country. They are designed for long life, made of steel cold drawn in our own plant, quality controlled from start to finish. You can rely on Reliance Snap Rings.

Send for your free copy of Engineering Bulletin No. 55 or write for the name of the nearest Eaton-Reliance representative.

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 29.90; No. 43, 29.70; No. 195, 31.30; No. 241, 31.50; No. 356, 29.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 23.50-24.50, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per ton, ton lots.

Cadmium: Sticks and bars, $1.55 per lb deld.

Cobalt: 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100 lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $55-90 per lb, nom.

Copper: Electrolytic, 25.00 deld.; custom smelters, 23.00; lake, 25.00 deld.; fire refined, 24.75 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-90 nom. per troy oz.

Lead: Common, 12.80; chemical, 12.90; corroding, 12.90, St. Louis, New York basis, add 0.20.

Lithium: 98 + %, 50-100 lb, cups or ingots, $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire, $15, f.o.b. Minneapolis.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. thick, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $228-232 per 76-lb flask.

Molybdenum: Unalloyed, turned extrusions, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter, 71.25 per lb of nickel content before 1 cent freight allowance, f.o.b. Copper Cliff, Ont.

Osmium: $70-100 per troy oz nom.

Palladium: $19-21 per troy oz.

Platinum: $72-75 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $7.00 per lb, commercial grade.

Silver: Open market, 88.625 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Rod, $60 per lb; sheet, $55 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 95.25; prompt, 95.125.

Titanium: Sponge, 99.3 + %, grade A-1 ductile (0.3% Fe max.), $2.25; grade A-2 (0.5% Fe max.), $2.00 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $3.15 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99 + % hydrogen reduced, $3.85.

Zinc: Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 11.35; special high grade, 11.75 deld. Diecasting alloy ingot No. 3, 14.25; No. 2, 15.25; No. 5, 14.75 deld.

Zirconium: Sponge, commercial grade, $5-10 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.00-25.50; No. 12 foundry alloy (No. 2 grade), 21.00-21.25; 5% silicon alloy, 0.60 Cu max., 25.00; 13 alloy, 0.60 Cu max., 25.00; 195 alloy, 24.00-25.75; 108 alloy, 21.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.00; grade 2, 21.25; grade 3, 20.00; grade 4, 18.00.

Brass Ingot: Red brass, No. 115, 24.75; tin bronze, No. 225, 33.50; No. 245, 28.25; high-leaded tin bronze, No. 305, 28.75; No. 1 yellow, No. 405, 20.25; manganese bronze, No. 421, 22.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.80, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.78, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 30.355; l.c.l., 30.98. Weatherproof, 30,000-lb lots, 32.53; l.c.l., 33.28. Magnet wire deld., 38.43, before quantity discounts.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $18.50 per cwt; pipe, full coils, $18.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $9.50-15.95; sheared mill plate, $8.00-11.50; wire, $7.50-11.50; forging billets, $6.00-7.60; hot-rolled and forged bars, $6.15-7.90.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; plate, $12.50-19.20; H.R. strip, $12.50-22.90; $11.00-17.40.

ZIRCONIUM

C.R. strip, $15.00-31.25; forged or H.R. bars, ribbon zinc in coils, 20.50; plates, 19.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strips, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.249-0.136	43.10-47.60	.....
0.135-0.096	43.60-48.70	40.50-41.10
0.095-0.077	44.30-50.50	40.60-41.30
0.076-0.061	44.90-52.80	40.80-42.00
0.060-0.048	45.60-55.10	41.40-43.10
0.047-0.038	46.20-57.90	41.90-44.50
0.037-0.030	46.60-62.90	42.30-46.30
0.029-0.024	47.20-54.70	42.60-47.00
0.023-0.019	48.20-58.10	43.70-45.40
0.018-0.017	49.00-55.40	44.30-46.00
0.016-0.015	49.90-56.30	45.10-46.80
0.014	50.90	46.10-47.80
0.013-0.012	52.10	46.80
0.011	53.10	48.00
0.010-0.0095	54.60	49.40
0.009-0.0085	55.90	50.90
0.008-0.0075	57.50	52.10
0.007	59.00	53.60
0.006	60.60	55.00

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.70	47.50
5050-F	43.80	48.60
3004-F	44.80	50.50
5052-F	44.40	51.20
6061-T6	46.90	53.00
2024-T4	50.60	57.40
7075-T6*	58.40	66.00

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	78.20	75.20	....	....
0.156-0.172	66.20	63.40	....	....
0.188	66.20	63.40	....	81.60
0.219-0.234	63.00	61.50	....	....
0.250-0.281	63.00	61.50	....	77.90
0.313	63.00	61.50	....	74.20
0.344	62.50	....	....	....
Cold-Finished				
0.375-0.547	62.50	61.30	74.80	69.80
0.563-0.688	62.50	61.30	71.10	65.50
0.719-1.000	61.00	59.70	64.90	61.70
1.063	61.00	59.70	....	59.60
1.125-1.500	58.60	57.40	62.80	59.60
Rolled				
1.563	57.00	55.70	....	....
1.625-2.000	56.30	54.90	....	57.50
2.125-2.500	54.80	53.40	....	....
2.563-3.375	53.20	51.70	....	....

Forging Stock: Round, Class 1, random lengths: 2014-F, 46.90-53.90, diam. 1-8 in.; 6061-F, 43.50-53.90, diam. 1-6 in.; 7075-F, 63.50-73.90, diam. 1-3.875 in.; 7079-F, 68.50-78.90, diam. 1-3.875 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$19.40	2	$ 59.90
1	30.50	4	165.05
1¼	41.30	6	296.10
1½	49.40	8	445.55

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.40-47.00	60.60-64.80
12-14	45.70-47.20	61.30-65.80
15-17	45.90-47.90	62.50-67.50
18-20	46.50-48.30	64.50-70.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, .25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Aluminum: 1100 clippings, 13.00-13.50; old sheets, 10.00-10.50; borings and turnings, 6.50-

BRASS MILL PRICES

MILL PRODUCTS a — SCRAP ALLOWANCES f

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	48.13b	45.36c	....	48.32	21.000	21.000	20.250
Yellow Brass	42.69	31.03d	43.23	45.60	16.125	15.875	14.500
Low Brass, 80%	44.90	44.84	45.44	47.71	17.875	17.625	17.125
Red Brass, 85%	45.67	45.61	46.21	48.48	18.625	18.375	17.875
Com. Bronze, 90%	46.98e	46.92	47.52	49.54	19.250	19.000	18.500
Manganese Bronze	50.81	44.91	55.44	....	14.875	14.625	14.125
Muntz Metal	45.19	41.00	....	....	15.125	14.875	14.375
Naval Brass	47.07	41.38	54.13	50.48	14.875	14.625	14.125
Silicon Bronze	52.84	52.03	52.88	54.77	20.625	20.375	19.625
Nickel Silver, 10%	57.93	60.26	60.26	....	21.125	20.875	10.562
Phos. Bronze, A-5%	67.17	67.67	67.67	68.85	21.875	21.625	20.625

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, or any or all kinds of scrap, add 1 cent per lb.

7.00; crankcase, 10.00-10.50; industrial castings, 10.00-10.50.

Copper and Brass: No. 1 heavy copper and wire, 16.50-17.00; No. 2 heavy copper and wire, 14.50-15.00; light copper, 12.50-13.00; No. 1 composition red brass, 14.00-14.50; No. 1 composition turnings, 13.00-13.50; new brass clippings, 12.50-13.00; light brass, 8.00-8.50; heavy yellow brass, 9.50-10.00; new brass rod ends, 11.00-11.50; auto radiators, unsweated, 10.50-11.00; cocks and faucets, 11.50-12.00; brass pipe, 11.50-12.00.

Lead: Heavy, 8.50-9.00; battery plates, 3.50-3.75; linotype and stereotype, 10.50-11.00; electrotype, 9.50-10.00; mixed babbitt, 10.50-11.00.

Monel: Clippings, 28.00-29.00; old sheets, 25.00-26.00; turnings, 20.00-23.00; rods, 28.00-29.00.

Nickel: Sheets and clips, 42.00-45.00; rolled anodes, 42.00-45.00; turnings, 37.00-40.00; rod ends, 42.00-45.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 2.75-3.00; old diecast scrap, 1.50-1.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 16.25-16.50;; 3003 clippings, 16.25-16.50; 6151 clippings, 15.75-16.50; 5052 clippings, 15.75-16.00; 2014 clippings, 15.25-16.00; 2017 clippings, 15.25-16.00; 2024 clippings, 15.25-16.00; mixed clippings, 14.75-15.00; old sheets, 12.25-12.50; old cast, 12.25-12.50; clean old cable (free of steel), 15.25-15.50; borings and turnings, 13.00-14.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 51.00; light scrap, 46.00; turnings and borings, 31.00.

Copper and Brass: No. 1 heavy copper and wire, 18.75; No. 2 heavy copper and wire, 17.25; light copper, 15.00; refinery brass (60% copper) per dry copper content, 16.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 18.75; No. 2 heavy copper and wire, 17.25; light copper, 15.00; No. 1 composition borings, 16.50; No. 1 composition solids, 17.00; heavy yellow brass solids, 11.50; yellow brass turnings, 10.50; radiators, 13.00.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 41.79; oval, 40.00, 5000-10,000 lb; electrodeposited, 31.25, 2000-5000 lb lots; cast, 36.25, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 113.50; 200-499 lb, 112.00; 500-999 lb, 111.50; 1000 lb or more, 111.00.

Zinc: Balls, 17.50; flat tops, 17.50; flats, 19.25; ovals, 18.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb in 100-lb drums.
Chromic Acid: 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30; f.o.b. Detroit.

Copper Cyanide: 100-200 lb, 68.40; 300-900 lb, 66.40; 1000-19,900 lb, 64.40.

Copper Sulphate: 100-1900 lb, 13.70; 2000-5900 lb, 11.70; 6000-11,900 lb, 11.45; 12,000-22,900 lb, 11.20; 23,000 lb or more, 10.70.

Nickel Chloride: 100 lb, 48.50; 200 lb, 46.50; 300 lb, 45.50; 400-9999 lb, 43.50; 10,000 lb or more, 40.50.

Nickel Sulphate: 5000-22,000 lb, 33.50; 23,000-35,900 lb, 33.00; 36,000 lb or more, 32.50.

Sodium Cyanide: 100 lb, 27.60; 200 lb, 25.90; 400 lb, 22.90; 1000 lb, 21.90; f.o.b. Detroit.

Sodium Stannate: Less than 100 lb, 75.80; 100-600 lb, 66.80; 700-1900 lb, 64.00; 2000-9900 lb, 62.20; 10,000 lb or more, 60.80.

Stannous Chloride (anhydrous): Less than 25 lb, 165.30; 25 lb, 130.30; 100 lb, 115.30; 400 lb, 112.90; 5200-19,600 lb, 100.70; 20,000 lb or more, 88.50.

Stannous Sulphate: Less than 50 lb, 128.10; 50 lb, 98.10; 100-1900 lb, 96.10; 2000 lb or more, 94.10.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 149*)

warehouses are estimated off more than 20 per cent, compared with the third quarter of last year.

Structural Shapes . . .

Structural Shape Prices, Page 138

Slight gains in structural steel demand are reported at various points over the country. The improvement is principally in public work, including bridges, schools, road and highway work. A continued upturn in demand is anticipated as the spring building season advances.

Competition for going business is keen. Virtually every project that comes out attracts far more bidders than in normal times. In the Pacific Northwest, for example, a good volume of business is developing, but fabricators there are bidding keenly on every new job that appears.

Most fabricators have accumulated fairly large inventories of shapes, and the mills no longer are under pressure for steel deliveries.

The 48 in. wide flange mill at Bethlehem, Pa., has resumed operation after a suspension of about three weeks for repairs. The standard shape mill at that point is now down for repairs. It should be back in production around Apr. 1.

Fabricating shops in New England adding to their backlogs or holding their own usually do so by price concessions. They also are meeting price competition from outdistrict shops that are invading the area on an increased scale.

Steel in place is 10 to 20 per cent lower than it was a year ago, with the smaller and medium-sized fabricators scrambling for tonnage.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3640 tons, Christie Street subway, Sec. 3, Manhattan, New York, through Arthur A. Johnson Corp. and Peter Kiewit, general contractors, to the Harris Structural Steel Co., New York.

1960 tons, County Office Building, Nassau, Long Island, N. Y., through John T. Brady & Co. Inc., general contractor, to the Bethlehem Fabricators, Bethlehem, Pa.

1383 tons, grade separations over Northwest Expressway at Foster and Central Avenues, Chicago, for Cook County, Ill., to Allied Structural Steel Companies, Chicago.

1150 tons, grade separations over Northwest Expressway at Ainslee Street and Lawrence Avenue, Chicago, for Cook County, Ill., to the American Bridge Div., U. S. Steel Corp., Pittsburgh.

450 tons, factory building, California Packing Co., Swedesboro, N. J., to the Keystone Structural Steel Co., Trenton, N. J.

300 tons, including reinforcing bars and bar joists, high school, Marshfield, Mass., to Waghorne-Brown (Bethlehem Fabricators Inc.) Boston, structurals; Barker Steel Co., Boston, reinforcing bars; Grande & Son Inc., Malden, Mass., general contractor.

200 tons, heat and power building, Air Force base, Suffolk County, New York, through Paul Tishman, to the Central Structural Steel Co., New York.

100 tons, junior high school, Louisville, to Steel Fabricators Co., Louisville; Sullivan & Cozzart, Louisville, general contractor.

100 tons, extension, Premier Laundry, Washland Inc., New York, to the Dreier Structural Steel Co. Inc., Long Island City, N. Y.

STRUCTURAL STEEL PENDING

1050 tons, state highway bridges, Route 128, Milton-Randolph-Quincy-Braintree, Mass.; Marinucci Bros. & Co. Inc., Boston, general contractor.

900 tons, also 2100 ft of steel piling and 80 steel piles, twin bridges, Snake River, near Ontario, Oreg.; bids to the Oregon Highway Commission, Portland, Oreg., Mar. 27.

800 tons, Portland, Oreg., shopping center, Lloyd Corp.; Donald M. Drake Co., Portland, apparently low on three schedules, $14,163,868.

780 tons, Home for the Aged, Uniondale, N. Y., Depot Construction Co., New York, low on general contract.

675 tons, also steel piling, Washington State, Skagit River highway bridge; general contract to the Manson Construction & Engineering Co., Seattle, low at $776,927.

500 tons, furnace supports, Public Service of New Jersey, Trenton, N. J., bids being asked by Foster Wheeler Co., New York.

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350 tons, state highway bridge, Bryon, Ill.; pending.

220 tons, 3-span WF-beam bridge, Woodford, Vt.; bids Mar. 21, Montpelier, Vt.; also, 55 tons of reinforcing bars.

200 tons, 4-span steel stringer bridges, Derby Street, Southeast Expressway, Hingham-Braintree, Mass.; bids Mar. 18.

REINFORCING BARS . . .

REINFORCING BARS PLACED

925 tons, municipal parking garage, Kingston-Bedford-Columbia Streets, Boston, to Northern Steel Inc., Boston; Wexler Construction Co., Newton Highlands, Mass., general contractor.

350 tons, Safeway warehouse center, Bellevue, Wash., to the Northwest Steel Rolling Mills Inc.; general contract to the Anderson-Westfall Co., Portland, Oreg.

335 tons, Washington State, highway bridge, Chelan County, to the Soule Steel Co., Seattle; Henry Hagman, Spokane, Wash., general contractor.

300 tons, women's dormitory, Emory University, Atlanta, to Joseph H. Fox & Co., Birmingham; J. A. Jones Construction Co., Atlanta, general contractor; 70 tons, structurals, Decatur Iron & Steel Co., Decatur, Ala.

240 tons, junior high school, Louisville, to the American Builders Supply Co., Louisville; Sullivan & Cozzart, Louisville, general contractor.

232 tons, junior college, Mt. Vernon, Wash., to the Bethlehem Pacific Coast Steel Corp., Seattle.

150 tons, Washington State, Green River Bridge to Joseph T. Ryerson & Son Inc., Seattle.

100 tons or more, state prison, first stage, Somers, Conn., to National Steel Fabricators Inc., Newington, Conn.; Bregman Construction Corp., New York, general contractor.

REINFORCING BARS PENDING

300 tons, Oregon, two bridges, Snake River; bids to Portland, Oreg., March 27.

300 tons, Washington State, two slab bridges; general contract to the Lewis Construction Co., Kennewick, Wash., low at $558,232.

160 tons, Washington State, Skagit River Bridge; general contract to the Manson Construction & Engineering Co., Seattle.

PLATES . . .

PLATES PLACED

500 tons or more, 7300 ft, 36 in. diameter, 5/16-in. steel plate water pipe for Anacortes, Wash., to the Beall Pipe & Tank Co., Portland, Oreg., at $207,474; balance of contract, 3760 ft of concrete cylinder pipe to the American Pipe & Construction Co., Portland, at $74,667; Carey & Kramer, Seattle, engineer.

350 tons, alloy, heat treated, Navy Purchasing Office, Washington, to the U. S. Steel Corp., Pittsburgh.

PIPE . . .

CAST IRON PIPE PLACED

220 tons, (second contract, same tonnage) various sizes, to the Pacific States Cast Iron Pipe Co. for Bellingham, Wash.

220 tons, 2 to 10 in., for Port Angeles, Wash., to the Pacific States Cast Iron Pipe Co., Seattle.

CAST IRON PIPE PENDING

250 tons or more, 24,500 ft of 3 to 8 in.; bids to John L. Sugars, clerk, Everett, Wash., Mar. 26.

250 tons or more, 19,000 ft of 6 and 8 in.; alternative bids for steel pipe; bids to Troy, Mont., Mar. 12; also for equipment and 100,000-gal steel water tank.

RAILS, CARS . . .

RAILROAD CARS PENDING

Alaska Railroad, six model St.2 section cars; Northwestern Motors Co., Eau Claire, Wis., low at $1111.10 each, to General Services Administration, Seattle.

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Rolls
ALLOY-CHILLED
Hyde Park
RAMS
for all types of
HYDRAULIC
EQUIPMENT
Hyde Park Rams are available in Chilled or Alloy Iron.
Furnished in hardness range to meet your specification . . . ground to your required size.
On your next replacement of Rams—or for new equipment—consult us. Our engineers will be glad to assist you.
Red Circle Rolls for every Purpose
Rolling Mill Equipment
Gray Iron Castings up to 80,000 lb.
Hyde Park
FOUNDRY & MACHINE CO.
Hyde Park, Westmoreland Co., Pa.
ROLLS
ROLLING MILL MACHINERY
GRAY IRON CASTINGS

XXVII

This is the twenty-seventh of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Cold-Finishing of Alloy Steels: The Effect of Cold-Drawing

The cold-drawing of alloy bars was discussed in the advertisement prior to this one, No. XXVI in the series. Here, we continue with a general explanation of the effect of cold-drawing.

During the cold-drawing process, certain changes take place in the steel structure, and in mechanical properties. There is a slight increase in tensile strength, compared with a substantial increase in yield point, and a decrease in ductility. These properties enable the production of small parts which require the greater strength necessary for certain automatic-machine forming operations, and a machine finish superior to hot-rolled material. Naturally, the beneficial effects of alloy steels are attained in the subsequent heat-treatment of parts.

The process of cold-drawing results in bars which are free from scale, accurate to shape, and within close tolerances. These conditions are ideal for automatic machining, as the elimination of scale is conducive to long tool life, and the accuracy of shape and close tolerances permit the bars to pass freely through the feed mechanism of the "automatic." Moreover, the cold-drawn finish and tolerances may be such that machining can be eliminated in some areas of the finished part. For example, sparkplug shells are produced from hexagon bars which require no machining on the hexagon sections.

Continuous roller hearths and car-bottom furnaces of both standard and controlled-atmosphere types, are used for special treatment of alloy bars before cold-drawing. Thermal stress-relieving can be used to reduce residual stresses in the steel caused by the cold-drawing process, wherein the mechanical properties will be altered depending upon the temperature used.

If you would like more specific details about the chemical composition or mechanical properties of cold-drawn alloy bars, and the results that can be expected, by all means consult our technical staff. Bethlehem metallurgists will gladly help you work out any problem, without cost or obligation on your part.

In the next advertisement, No. XXVIII in this series, the second category in cold-finishing will be discussed, i. e., the turning and grinding of alloy steel bars.

Remember that Bethlehem produces a wide and complete range of cold-drawn alloy steel bars in rounds, hexagons, squares, or flats, in standard, odd, decimal or metric sizes required, as well as special sections. Bethlehem also makes the full range of AISI standard alloy steels, and special-analysis steels and all carbon grades.

If you would like reprints of this series of advertisements from No. I to No. XXVII, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The first 27 subjects in the series are now available in a handy 40-page booklet, and we shall be glad to send you a free copy.

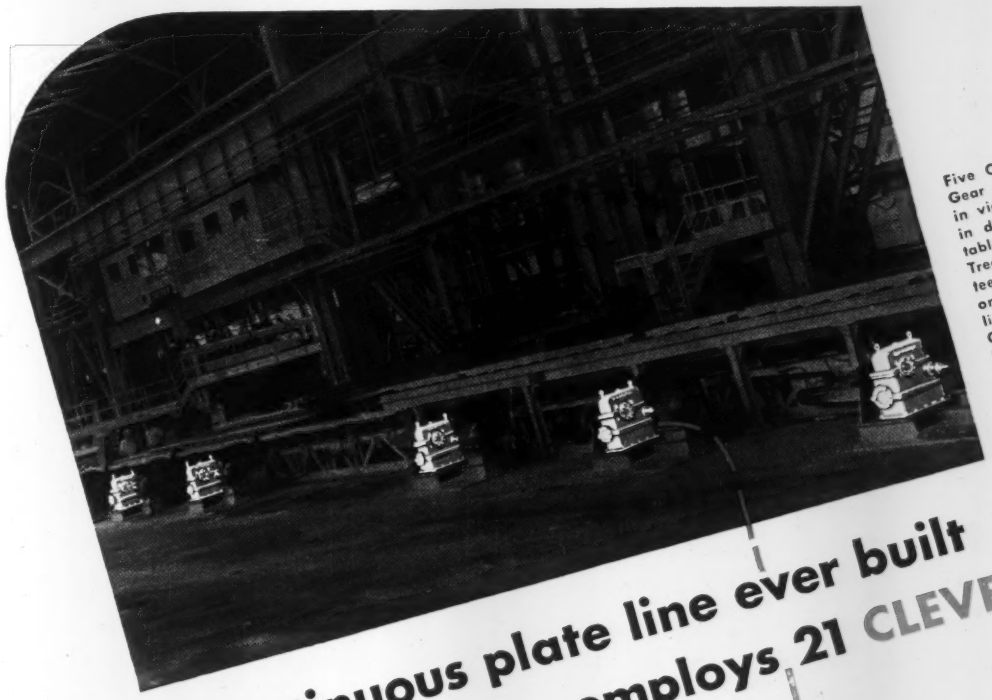
BETHLEHEM STEEL COMPANY

BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



Five Cleveland Worm Gear Speed Reducers, in view, are engaged in driving the layout table for these Heat Treating furnaces. Sixteen others are in use on other parts of this line, built by the Drever Company, Bethayres, Pa., and installed in the plant of Lukens Steel Co., Coatesville, Pa.

Largest continuous plate line ever built employs 21 CLEVELANDS

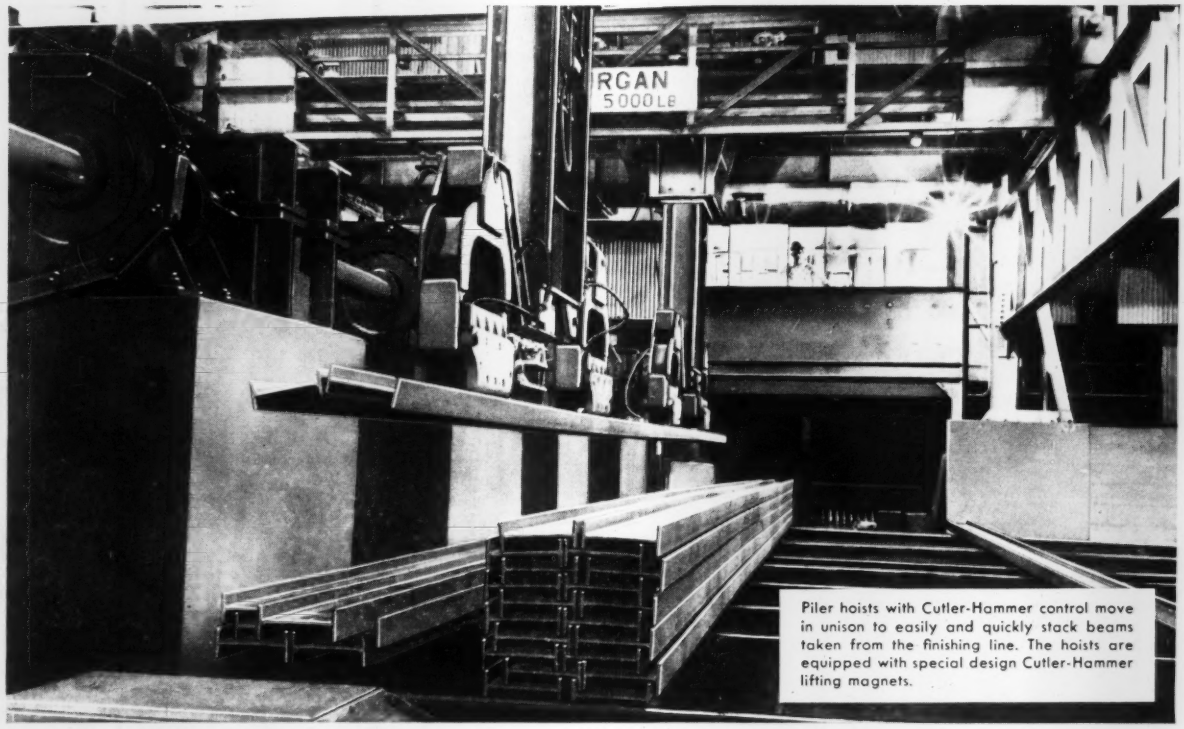
THE drives will never be a problem on this, the largest continuous heavy plate line ever built. Twenty-one Cleveland Worm Gear Speed Reducers assure smooth, uninterrupted transmission of power from motors to table mechanism in this Heat Treating furnace line.

Cleveland worm gear speed reducers are ideally suited for an installation of this magnitude. Space is saved by the compact Cleveland design. Installation is easy and maintenance is negligible. You'll find Clevelands throughout the steel industry, in every phase of operation. And, in case after case, Cleveland speed reducers have proved to be so dependable and long-wearing that they outlast the machines they drive.

Get full engineering data on the Cleveland line. Catalog 400 is free—write today. The Cleveland Worm & Gear Company, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers



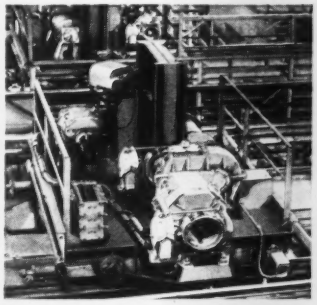
Piler hoists with Cutler-Hammer control move in unison to easily and quickly stack beams taken from the finishing line. The hoists are equipped with special design Cutler-Hammer lifting magnets.

Cutler-Hammer Control and Magnets team to cut beam handling costs

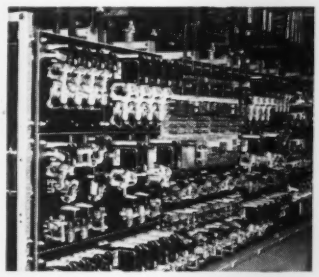
Classifying and stacking finished beams to fill customer orders has always been a production bottleneck involving both back-breaking manual handling and the frequent use of an overhead crane withdrawn from its normal service. But now at U. S. Steel's South Works, the job is done quickly and safely by special beam piling cranes equipped with Cutler-Hammer D-c magnetic crane control and special Cutler-Hammer bi-polar lifting magnets. The heart of this beam handling system is the unique controller which automatically positions the hoist trolleys accurately on adjacent piler crane bridges. With this modern electrical equipment, which includes a Cutler-Hammer designed magnetic amplifier type position regulator, the piler hoist operator simply and easily selects beams as specified from the end of the finishing line and stacks them according to the orders in hand.

This is another typical example of mill engineers and Cutler-Hammer engineers working together to solve mill problems. Another instance among many at the great USS South Works where Cutler-Hammer equipment serves faithfully from the giant ore unloaders at the start of mill operations to the unique piler hoists at the very end of the finishing line. You too will find it pays to work with Cutler-Hammer to gain new efficiency and new savings with time-honored Cutler-Hammer dependability.

CUTLER-HAMMER Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin.
Associate: Canadian Cutler-Hammer, Ltd., Toronto.



Overhead view of beam piling hoists showing Cutler-Hammer brakes and limit switches used.



Cutler-Hammer control panel for unique piler hoists at USS South Works.

CUTLER-HAMMER
MOTOR CONTROL
C-H

LOOK TO CUTLER-HAMMER MILL EXPERIENCE . . . AS BROAD AS IT IS LONG